ELECTRICAL REVIEW

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VIEWS, NEWS AND INTERVIEWS.

"Professor Alexander Graham Bell is very chary of how he disposes of portraits of himself," said a gentleman who was associated with the inventor in his laboratory for several years. "I had attempted once or twice to get him to give me his portrait, but without success. One day his house was damaged by fire, and while I was assisting him in clearing up the wreck after the fire was out, I came across one of his photographs slightly damaged by water. I told him I was going to keep it and he said all right. I have never seen any good portrait of Professor Bell published, except that which recently appeared in the ELECTRICAL REVIEW."

The New York–Chicago telephone line was opened on Tuesday, October 18. On Saturday, October 22, the editor of the ELECTRICAL REVIEW was in Chicago and, desiring to speak to a member of the staff, stepped into the Rand-McNally building, Chicago, and called up the ELECTRICAL REVIEW office, New York. A very satisfactory and clear conversation was held and the practical working of the line was fully demonstrated.

"The wire is known as No. 3–0 and weighs about a foot to the pound."—*Newport, R. I., Observer.*

There are 512,500 telephones in use in the United States, says a floating paragraph. That they're in use no one will doubt who has constantly been exasperated by Central's stereotyped answer: "Line's busy now."—*Boston Globe.*

The Corliss Steam Engine Company, of Providence, has completed an immense engine for the Fall River Iron Works Company. This engine is said to be the largest of its kind in the country. Following are the diameter dimensions of its cylinders: Two 23½, two 36 and two 54 inches. The flywheel is a 28 foot one, and carries four belts —two 44 inches wide, one 38 and one 50.

John W. Mackay authorizes a positive denial of the recent rumors that the Postal Telegraph Company has been sold out to the Western Union, and states that there is absolutely no foundation for these reports.

Col. John B. Powell, former general manager of the Brush-Swan Electric Company and one of the early workers in electric light circles, is said to be the author of the explanation made in the early days of arc light competition of the difference between a double carbon lamp and a single carbon lamp. A gentleman from "way-back" called to have some lights put in his country town and made considerable objection to the fact that he could buy single carbon lamps for $65, while $90 was the price for double carbon lamps. "Oh! but you must remember," replied the resourceful Colonel, "that the double carbon lamp lights both sides of the street at once." "I never thought of that, I swan," responded the villager, and the sale was at once made for the double carbon lamps.

LIKES OUR EDITORIALS.

THE OPINION OF THE PRESIDENT OF THE NEW ENGLAND ENGINEERING COMPANY, WHO IS ALSO ONE OF THE LARGEST ELECTRIC STREET RAILWAY BUILDERS OF THE DAY—THE REVIEW'S EDITORIAL COLUMNS OF UNTOLD VALUE TO ALL ELECTRICAL ENTERPRISES.

TO THE EDITOR OF ELECTRICAL REVIEW:

I wish to congratulate you heartily on the great improvements that you have made in the ELECTRICAL REVIEW during the past two years, and especially during the past year, making it a great pleasure for all electric men to read. The editorials appearing in the paper have handled some of the prominent electrical questions in a masterly way, and have been of untold value to all electrical enterprises. The late articles on the trolley system have certainly been of great value. They have awakened the daily press to a realizing sense that they were opposing the progress of a valuable and safe system without careful investigation. The articles in the REVIEW have evidently started many of them on tours of investigation which have changed their minds, and they have given the public the benefit of these investigations, which could not help but be favorable to the electric system.

Another feature of your paper, which is very pleasing to me, is that it is wholly electrical, and also extremely reliable.

The marked improvements have made

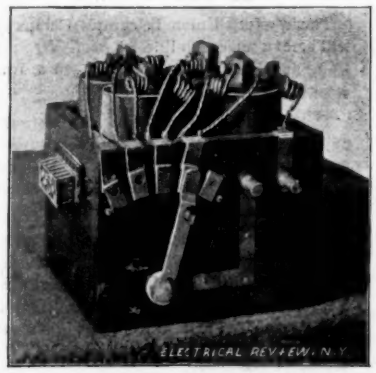


FIG. 1.—GENERAL VIEW OF PROFESSOR STINE'S TESTING BATTERY SET.

your paper second to none, and if such improvements are continued, your paper will certainly be recognized as the best published in this country or in any other.

Very truly yours,

(Signed) A. M. YOUNG.

Waterbury, Conn., October 7.

The Wells Memorial Institute for Workingmen, Boston, has begun another year of usefulness with a profitable and interesting series of educational classes, lectures and entertainments.

A Convenient Testing Battery Box.

BY PROFESSOR W. M. STINE.

A portable battery is something which well repays the labor expended in its construction. Fig. 1 shows a convenient size for all ordinary laboratory and station tests

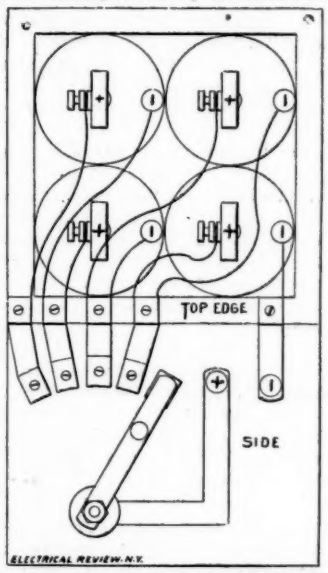


FIG. 2.—PLAN VIEW OF PROFESSOR STINE'S TESTING BATTERY SET.

and measurements. The box in this case is of walnut and made to just contain four cells of Ajax dry battery. The connections are such as to enable all the cells to be used in series. The battery wires are soldered to brass plates on the edge of the front side of box and are connected by thin copper strips to the contact pieces arranged on an arc beneath. The contacts are made from flat brass; there being one contact more than the number of cells to enable the circuit to be opened. The sliding contact lever is of stout spring brass and has a rubber knob attached. The plan view of the box, as well as the manner of making the connections for series is given in Fig. 2.

The entire outfit weighs but little and can readily be carried about by means of the handles attached to the ends. A leather strap would render it more portable. This box, together with one containing Leclanché cells, has been in constant use in laboratory and station work for some time past and has proven indispensable. They have done away with the careless practice of placing cells side by side and cross connecting them with wires.

In many electric light stations where the writer has found a bridge testing set in use, the battery was stowed away in some corner or behind the switchboard, the cells being either covered with dust or in dangerous proximity to the switchboard wiring. A little time devoted to the making of a box will be well spent, for the cells are always in readiness for use and kept in better condition than when placed away in odd corners. This arrangement will be found much cheaper and just as efficient as the rather expensive chloride of silver batteries.

Ohio University, Oct. 29, 1892.

LIGHT AND POWER STATIONS.

SOME HINTS TO OWNERS AND OPERATORS BY A PRACTICAL ENGINEER.

Desirability of Ample Engine and Boiler Capacity—Bad Service is Sure to Result From an Overworked Plant—Steady and Reliable Service Should be the Chief Aim of the Central Station Manager—Interesting Incidents.

BY ROBB MACKIE.

X.

In view of the present able discussion in the technical press of the relative merits of the various types of boilers and engines for use in central station work, more than a passing allusion to these important factors would be superfluous. A suggestion or so to the contemplating purchaser as to some of the more prominent features will, however, not be out of order.

Be sure, then, to have ample boiler and engine capacity for the work to be done; a few additional horse-power cut no very great figure in the cost of a plant and will be found to aid materially in keeping the repair account at a minimum figure.

In many stations the steam plant is, owing to overload on the station, taxed to the utmost capacity and when a change of fuel or firemen is necessary, or when the wind is from the wrong quarter and the draught is poor or any other one of half a dozen causes prevents holding the steam pressure at the maximum, it is impossible to hold the engines up to speed, which results in the dynamos operating improperly, and poor service follows.

With boilers and engines not overworked, but with ample capacity for all loads, this condition will not result and better service is obtained with consequent better satisfaction of patrons and more profitable business.

Bear in mind that in a measure all boilers, engines, dynamos, etc., are like men—if they are overworked they are sure to give bad service somewhere. The very worst place to begin overworking is at the engines and boilers of your plant, for the overworking of these important factors results, as a rule, in a rapid deterioration of the plant with consequent "break downs" and interruption to service, to say nothing of the constant and increasing costly repairs.

In this connection it is well to point out that there is nothing which will eat into the revenue of an electrical plant as fast as the deductions made on consumers' bills for "outages" and "bad service," and that interruptions to the service, or irregular quality of lights or service, are the quickest way to cause customers to first become dissatisfied, then "kickers," and finally to order the service "cut off."

To give steady, reliable and constantly regular service should be the chief aim and effort of the central station manager, and "shut down" should be the very last order given in any station during operating hours. Too much stress cannot be laid on this point, and a manager should use every endeavor to bridge over any trouble in his

station or on the lines, and keep the current on the lines according to contract, or until he notifies all customers affected that it will be necessary to discontinue service for a time, for only by such regular reliable service is to be achieved the greatest success in the operation of an electrical plant.

An incident once happening under my own observation will illustrate the extent that one of the most successful station managers in the country thought it necessary to carry this rule, never to shut down, into effect.

In a large station, one evening, the main bearing of one of the largest engines in the plant began heating and soon was in a condition which caused the engineer to send word to the manager that it would be necessary to stop this engine and shut off about one-third of the load on the station. Electricity does not move more quickly or with more lurid glare than did that manager with his phosphorescent effect of ejaculatory sentences as he flew to the engine room. "Shut down?" he cried, "you blankety blank old noodle head, don't you know this plant *never* shuts down when running a load? Where is the hot bearing? Get out that fire hose! Belts did you say? Blankety blank the belts! Turn the hose on that bearing and keep that engine running if the shaft melts off!"

Damage? Yes, there was about $300 damage to bearing and belting, but the plant ran through the evening, the service was maintained and the reputation of the station for constant service was kept up. And that very fact of constant reliable service has enabled the building up of one of the best paying electrical plants in the country.

At another time this same man held a commutator brush in place for three hours on which a brush holder set screw had given out, rather than even momentarily shut down the circuit this dynamo was operating. He had no extra dynamo to transfer this circuit to, and it was either hold the brush or shut down for five or ten minutes for repairs and he chose the former. There are lessons in these illustrations that can be taken to heart by many station men, who will, upon the least provocation, shut off a circuit without a moment's warning.

The boiler, engine and dynamo equipment is the most important point of an entire system, and here must the first and most protracted effort be made to keep the plant at all times in running order, for only by so doing is it possible for a station to give the constant reliable service which not only produces dividends, but adds greatly to the satisfaction of customers and increases the business done over the lines.

As an additional safeguard to insure this, it is best, in the majority of cases, to have two or more engines to do a given amount of work rather than to be dependent upon one. There is hardly a station in operation to day, excepting a few that have a load of city street lights only, on which the load is so disposed that it all comes on at a stated time and after a few hours' run drops off to a minimum, thus permitting starting up and running the engines at their most economical point throughout the run. On the contrary, in the majority of cases, the full load is only on the station for a few hours, after which it falls away to one-third and finally to less than one quarter and more times to even a smaller percentage for the greater part of the 24 hours. It is therefore far more economical to have the engines divided into proper units so as to dispose of the load at times to the highest economical advantage, whether the load be light or heavy.

(To be continued.)

A new switchboard has just been finished at the Thomson-Houston works for the World's Fair. It is composed of 20 slabs of white marble in four tiers, each tier being five slabs high. The three bottom tiers are for the plugs, the fourth for the ammeters, and the fifth for the lightning arresters. There are 80 lightning arresters, 40 ammeters, 64,000 bushings for plugs and 3,280 rubber buttons. It is a 40 circuit board with 328 changes.

Notes on the Opening of the New York-Chicago Telephone Line.

What a field for speculation and what glorious opportunities the opening of the New York-Chicago telephone line affords! It would seem possible to utilize these two copper wires for nine simultaneous transmissions of messages; one telephonic conversation and by the quadruplex four telegraphic transmissions on each leg of the telephone circuit.

The primary historical event in the life of the telephone was the transmission of speech at the Centennial exhibition in 1876 over a line, at one end of which was Prof. Alexander Graham Bell and at the other end William H. Hubbard. Among the witnesses of this occurrence were Dom Pedro (Emperor of Brazil), Sir William Thomson (Lord Kelvin), and Mr. W. D. Sargent, now the vice-president and general manager of the New York and New Jersey Telephone Company. The second event of historical interest was the opening of the New York-Chicago line, the longest telephone circuit in the world. The third event will be the telephonic connection of New York and San Francisco, which is merely a commercial problem. It has been estimated that if ten telephone circuits between New York and San Francisco could be operated continuously during a business day, about six hours, the charge for a five minutes conversation would have to be about $250 to enable the lines to be run without loss. This estimate leaves out of account possible revenues from a telegraphic use of the wires and the leasing of the lines at night to newspapers. Even at $250 for a five minutes' talk, a business man would save money, when the cost of a trip to San Francisco and back, with the incident loss of time, is considered.

The newspapers already appreciate the value of direct speech between New York and Chicago. The Brooklyn *Standard-Union* and the Chicago *Tribune* have both used the line for the transmission of a large amount of news matter.

The telephone cabinet and set used by Professor Bell and the mayors of New York and Chicago at the opening of the line have been put in a safe place and will be carefully preserved by the American Telephone and Telegraph Company.

The ELECTRICAL REVIEW was the only journal in the country which gave a complete illustrated account of the opening of the line. The picture published in last week's issue showing Professor Bell at the telephone will increase in historical interest and value as the years pass. Its original publication in the ELECTRICAL REVIEW has created a great demand for the issue of the paper containing it. Although an extra edition was printed any of our readers who desire extra copies should order them at once as the supply will not last forever.

It is estimated that a No. 0 B. W. G. pure copper wire is large enough to transmit speech from New York to San Francisco, provided the surrounding conditions are proper.

Elegant offices for the use of New York and Chicago patrons are being fitted up in the Rand-McNally Building, Chicago, and in the telephone building at 18 Cortlandt street, New York. Besides a well-furnished and equipped room for the use of the general public, smaller rooms will be available, where board meetings may be held by business men in the two cities, transactions being carried on by telephone. The business carried on over this line will be of a very high class character.

An interesting incident happened at the Chicago end of the line during the opening ceremonies, when Mr. William Berri, proprietor of the Brooklyn *Standard-Union*, talked over the wire. Mr. Berri dictated an article to his stenographer, who was in the editorial rooms in Brooklyn, and then called up Managing Editor John A. Halton, with whom he conversed a few minutes. Editor Murat Halstead then talked with Mr. Berri, and after this a few other people used the line. Mr. Berri then came back to the 'phone and called up Mr. Halton again. While talking with him Mr. Berri heard a peculiar noise on the wire and asked what it was. The reply was that the presses had just started up to run off the first edition of the paper. The noise came through several rooms before reaching the editorial rooms where the telephone was located, and then traveled along the wire 1,000 miles to Chicago. In this brief time Mr Berri's article had been written out in long hand, set in type, stereotyped, put on the press and the presses started.

Mayor Grant had a little difficulty at first in understanding Mayor Washburn, although the latter heard the former perfectly. The reason for this may be explained by the fact that in the winter, during the sessions of the New York Assembly, Mayor Grant has daily conversations by long distance telephone with his friends in Albany. He is, therefore, an experienced "telephoner," while such would not seem to be the case with the Chicago mayor. Mr. Washburn will doubtless have frequent occasion from now on to use the New York-Chicago line, and will improve with practice. When it comes to talking it isn't often that a Chicagoan gets left.

When you use any long distance telephone place your mouth very near the transmitter and speak in clear, distinct tones, but not too loud. Professor Bell's position at the instrument as shown in the historical picture in last week's ELECTRICAL REVIEW, is the correct one.

The rate for long distance talking between Chicago and Boston has been fixed at $10 for each five minutes. It is probable that a reduction will be later made in the entire long distance service for extended conversation. At present only about 6 five-minute conversations in each hour can be put upon a long distance circuit, as one-half the time is consumed in establishing connections, making appointments, etc., for which there is no charge.

The American Telephone and Telegraph Company has about 3,000 miles of pole lines, but there was a total January 1, 1892, of 41,298 miles of pole lines in the extra territorial and toll lines system.

TELEGRAPH NEWS.

The Western Union Telegraph Company will erect a telegraph line between Virginia Point and North Galveston, Tex., in a few weeks.

The business men of Auburn, Me., are agitating the question of better telegraph facilities. The present location of the telegraph office is inconvenient and business men lose much time in consequence.

There are rumors afloat that a portion of the increased capital of Western Union Company is to be used to absorb the Montreal Telegraph Company, of Canada. Report has it that the basis will be two shares of Western Union stock for one share of the Montreal company.

The Western Union and Postal Telegraph Companies have locked horns in Chicago. Last week the Phœnix Insurance Company sold its buildings, in which are the Postal's offices, to the Western Union Company. The Postal is paying a high rental in consideration of a clause in the lease that provides that during the term the lessor shall not lease offices in said building to any other telegraph company. The Postal therefore has begun suit for injunction against the Phœnix company to prevent the Western Union from using the building until the Postal's lease has expired. The contract has six years to run.

A Novel Application of Electric Lighting to Church Illumination.

A novel display of electric lighting and what is probably the only one of its kind in existence, is to be seen in the Collegiate Reformed Protestant Dutch Church on Second avenue in this city. This church, or rather the original society from which the present church has grown, is one of the oldest in the country, having been organized under Peter Minuit, director-general of the New Netherlands, in 1628, and chartered by William III., King of England, in 1696. The present structure was erected in 1891, and is a handsome gray stone building, having a frontage of 50 feet on Second avenue and extending back 125 feet, at which point an L runs through to Seventh street, giving a separate entrance to the Sunday-school, which is situated in the rear of the church proper.

The church is so located that the only windows through which sunlight is admitted are in the ends and sides of the sloping roof. These are too high up for any decorative purposes. Both side walls of the church are built close up to the adjoining buildings, shutting out the light on the sides completely. As the congregation were desirous of keeping alive the historical memories which cluster so thickly around the church, by the use of illuminated stained glass windows, electricity was called upon to aid them, and the result is most satisfactory and at the same time extremely unique. There are eight of these windows, four on each side, through which a soft light is shed throughout the entire body of the church. They are 12 feet high by 5 feet wide, and were made by the Tiffany Glass and Decorative Company of this city. Five of them are memorial windows and the balance are the same as those ordinarily used.

The illuminating part of the work was placed in the hands of the United Electric Light and Power Company, of New York, and while the character of the work required of them was extremely arduous, they have accomplished it in a most satisfactory manner.

In the first place apertures corresponding in size to the inside framework of the windows were cut through the side walls of the church, leaving a space of about 18 inches between the interior plastering and the dead wall of the adjoining building. This dead wall was covered with highly polished corrugated tin, converting the entire surface into a powerful reflector. Connection was then made with the 1,000 volt incandescent circuit of the United States Electric Lighting Company, whose wires run through Second avenue, and the current carried by the Westinghouse two-wire system through metal pipes into the basement of the church. Here it passes through two sets of Westinghouse converters coupled in series, and registers 100 volts at the meters before being carried into the body of the church. A primary switch placed above the converters enables the current to be entirely cut off at will. The current after passing through the meters is carried through conduits to the side windows, where the lights are grouped in front of the tin reflectors so as to give the best results. The windows themselves are so arranged as to slide easily to one side, giving free access to the lights in case of any necessary repairs being needed.

Each window is supplied with an average of 12 lights, varying from 16 to 25 candlepower, and when, by turning a small switch set into the wall just below each window, the current is thrown in, the effect produced is the same as though the entire exterior surface of the glass was bathed in the strong rays of a mid-day sun.

The entire plant, including the overhead chandeliers and the side lights in the gallery and Sunday-school, consists of something over 300 lamps. The Interior Conduit and Insulation Company's conduits are used throughout, and no wires are anywhere visible.

The property of the Boston Electric Time Company has been sold by auction under foreclosure of mortgage.

A NEW RHEOSTAT.

READ AT THE GENERAL MEETING OF THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, CHICAGO, ILL., JUNE 7, 1892, BY CHARLES E. CARPENTER.

It is a well-known fact that an insulated wire suspended in the air will carry a given amount of current at a lower temperature than the same wire without this covering of insulation under the same conditions. This is obviously due to the fact that while the cross-section of both conductors is the same, the one which is insulated has a much larger radiating surface than the bare wire, and therefore dissipates the heat conducted

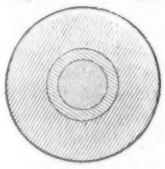
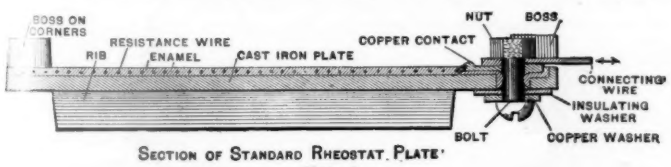


FIG. 1.

through the insulation more rapidly. Suppose for convenience of illustration, we conceive a conductor to be first covered with some insulating substance, and then enclosed within a metallic tube so that its insulated surface shall fit perfectly within and against the inside surface of the tube, as shown in section in Fig. 1. We thus have a comparatively small conductor with a largely increased radiating surface, and the insulation between the two metallic bodies does not materially obstruct the flux of heat from the conductor to the outside metallic shell.

One of the early experiments of the writer in electric heating—in fact, his first successful apparatus—consisted of two iron plates, between which was interposed an iron resistance wire of the "reflex" or "zig-zag" type insulated from both plates by means of thin sheets of mica or asbestos paper, with screws passing through one plate and engaging the other. By this means the plates could be pressed into close relation to the resistance wire. By connecting this apparatus to a constant potential system, the current at first would be comparatively large, but would gradually decrease, as the temperature of the plates increased, until a point was reached where the heat was dissipated as fast as generated. By tightening or loosening the screws, the current could then be either increased or decreased. This increase of the current by increasing the mechanical pressure is due to a reduction of temperature effected by the more intimate heat conducting relations between the resistance and plate, facilitating the flux of heat. The better the conduction for heat is made, the less will be the difference of temperature between the wire and the outside radiating surface plate, and it follows that the larger the surface of the radiating plates which are closely impressed upon the conductor, the larger will be the current-carrying capacity of the latter.



SECTION OF STANDARD RHEOSTAT PLATE.

FIG. 2.

These experiments are cited as an illustration leading to a thorough appreciation of the extent to which the current capacity of a resistance wire may be carried, as it is upon this principle, but with modifications of construction, that the new and improved rheostat herein described is based, that is, a resistance wire of small cross-section is used, but a large radiating capacity is secured by placing the wire in such relations to a metal plate as to practically increase its radiating surface to a very great extent.

The results of the experiments described above suggested a modified form of construction, one in which the resistance would be entirely covered by a medium which would protect the wire from oxidation and yet act as a good insulator of electricity and a good conductor of heat, and which will permanently attach the wire to, but insulate it from, a radiating plate. A special enamel was finally found by the writer to be suitable for this purpose. A section of this construction is shown in Fig. 2.

The injurious effect of linear expansion of the resistance wire, due to heat, is avoided in this method by the "reflexed" or "zig-zag" form in which the wire is bent, as shown in Fig. 3, and it has been demonstrated by experience that this linear expansion is thereby so distributed as not to injure or crack off the enamel in practice.

On this principle, since we are able to greatly reduce the cross section of the conductor, it follows that its length is also proportionately shortened for any required resistance, and no consideration of mechanical strength of the wire enters into this construction, since it is so perfectly confined and supported on all sides.

Practice has demonstrated that 20 watts of electrical energy may be dissipated continuously to each square inch of resistance surface without injury to the apparatus. However, on account of the excessive temperature of the plate used in close proximity to the other materials, it is not practicable to dissipate over eight or ten watts to the square inch in continuous service.

By placing one surface of the plate in contact with water, so that its heat is dissipated in this manner, we are able to continuously dissipate about 25 watts to the square inch. From this, it will be seen, that by means of water we are able to increase the capacity of a certain plate to about three times that of the same plate dissipating its heat directly into the atmosphere, or we may decrease the size of the plate to one-third for the same capacity where water is used.

In many applications, especially in railway work, apparatus is often subjected to a load far beyond its rated capacity. Rheostat plates for such service are made with narrow ribs, between which the resistance wire and enamel are placed. It is found that by means of these ribs, the safe carrying capacity of a wire is greatly increased, while the ribs serve also to protect the insulation and wires from mechanical injury.

In adapting this construction to meet practical requirements in its several applications, it is necessary to alter only in detail the general construction and distribution before explained and shown in Fig. 3, which shows the usual plan of distributing the wires in a simple rheostat plate. Connection to the resistance wire is made by means of a sheet copper contact strip, one portion of which is folded back upon itself, and after inserting a portion of the wire this sheet copper is crushed about it. The joint so formed cannot oxidize, since it is completely sealed by the enamel fused about it.

To divide the resistance so formed into steps, it is only necessary to place contacts for connection to the resistance wire at convenient points where the loops approach the edge of the plate, as at *a* and so on, in Fig. 3. This particular way of locating the connecting points on one side of the plate is especially convenient in using these plates with small motors, where only few steps or divisions of the resistance are required. A modification of this arrangement is to have the connecting points alternate from one side of the plate to the other, as at *b*, *a*, etc., Fig. 3. A distribution best adapted for stage or field controlling rheostat, or one in which a great number of steps are required, is secured by arranging the resistance in a similar manner around the entire outer portion of a disk with contact connections near the circumference. Another arrangement is required in a plate of low resistance and high ampere capacity. In this case several coils are placed in parallel and connected to a common contact piece.

The plates, with their coils and contacts distributed as above described, are well suited for use in connection with rheostat switches. They are provided with ribs or blades for extending their radiating surface, and lugs at the corners for convenience in attaching them to the back of the switch. Each contact of the resistance plate is connected by a very short wire or strip to the corresponding contact piece on the rheostat switch.

A very simple and complete rheostat is made by placing the switch contacts and lever, properly insulated, directly upon the radiating plate, on the surface opposite the resistance face. With this arrangement as shown in Fig. 4, a rheostat is obtained which is no larger than the switch parts alone of existing rheostats.

To make a single plate large enough to dissipate the energy wasted in the rheostat in starting a large motor, would make it necessary to have a surface so large as to be objectionable. To avoid this difficulty, a number of plates of, say, 10 inches square, are placed in parallel with each other, but separated by sufficient space to admit of proper ventilation, and connection made from the switch contacts to the contacts upon the various plates as required. With this arrangement, a rheostat of very large watt capacity may be placed within a small cubic space.

This form of rheostat, by reason of its compactness, is well adapted for use with arc lamps on constant potential circuits. In this application, the resistance plate may be attached directly to the outside of the casing, leaving just sufficient space between the casing and the plate for ventilation. Where the casing is cylindrical, the plate may be disk shaped and placed on top of the cylindrical casing, with holes in the plate for the hooks and chimney to pass through. A valuable feature of this rheostat in this application is that it will endure exposure to the weather while in use. As an example of this, the writer knows of a case where one of these plates has now been in use on a pair of lamps for over seven months, where the plate is in a horizontal position, with the enameled side up and water dripping upon it continually.

In some places the heating effects of rheostats should be avoided. For example, in stage controllers five to ten kilowatts continuously converted into heat is extremely objectionable in warm weather. This may be done by conveying the heat away through the agency of running water. To accomplish this the resistance plate may be hollow, with inlet and outlet pipes connected directly to a source of water supply. By this means and with proper circulation the plates will always be comparatively cold, and no sensible amount of heat will be given off to the surrounding atmosphere, while the size of the apparatus is so reduced as to occupy no considerable amount of space.

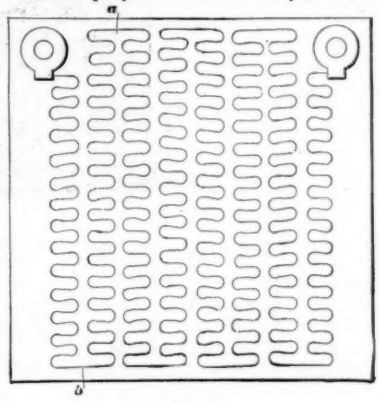


FIG. 3.

It is evident that numerous modifications of this general design may easily be made to adapt the apparatus to the requirements of practice.

The following facts are true regarding this form of rheostat:

1. It is fireproof, as no combustible material enters into its construction, and it can never be submitted in normal use to a temperature so high as that to which it is subjected in the process of manufacture.

2. It is durable, since the resistance wires cannot deteriorate from oxidation, electrolysis, etc.

3. It is compact, as it requires less than five per cent. of the cubic space required by the ordinary coiled wire rheostat of the same capacity.

4. It is simple, the three necessary elements, resistance wire, insulation and radiating surface plate, being fused into one integral mass.

5. It is cheap, for a certain resistance and carrying capacity can be obtained by the use of a wire whose cross section and length will both be but one-tenth of that required for a wire used in the air. That is, the total weight of wire, and hence the cost of the same, will be but one per cent. of that usually required.

6. It is unaffected by heat, cold, acids, alkalies, oils and other chemicals, and for this reason is especially adapted for use in mines, breweries, marine vessels, etc., where chemical action rapidly destroys ordinary insulators. It is even practicable to operate these plates submerged in flowing water, in case it is desirable to carry off the heat in this way.

Another and important application of this method of converting electric energy into heat in a compact form is for the operation of various heating devices.

The requirements of a commercially successful electric heating device are:

1. The concentration upon the working surface of the apparatus of practically all of the heat produced in the resistance, thus preventing as far as possible the dissipation of heat by radiation or conduction to other bodies or parts than those it is required to heat.

2. The ability to rapidly supply a large amount of heat energy from the resistance to the working surface, through a medium having a high conductivity for heat, thus keeping the working surface at the proper temperature even when a large amount of heat is rapidly drawn from it.

3. The protection of the resistance wire from deterioration by chemical and electrical action, so that its life shall be indefinitely prolonged.

All the above requirements are fulfilled in this device.

DISCUSSION.

The President: Gentlemen, you have heard Mr. Carpenter's interesting paper. I am sure those who have had anything to do with rheostats will appreciate the very practical and simple form in which this rheostat is presented. I see many applications of it which are of interest and may be made practical. If there is any discussion on this paper, we shall be glad to hear it.

Mr. Sperry: Mr. President, I would like to call out some points with reference to it. I would like to know if the rheostat has been designed for heavy currents, and if so, what is the heaviest that has been used?

Mr. Carpenter: We are manufacturing resistance plates of low resistance and high ampere capacity. In these low resistance plates several wires are in parallel or multiple, and have a capacity depending upon the kind and size of the wire, from 25 to 200 amperes or more. A 50 kilowatt 500 volt motor starter is made up of a number of these low resistance plates connected in series. Each plate has four wires in parallel and each plate forms a step or division of the rheostat. The plates for this size of motor are 18 inches long and three inches wide, and weigh about four pounds. Twelve or 14 of each are used for this size of machine.

These series plates have the coils or wires enameled between ribs for increasing the adhesion of the enamel to the plate. It has been found by experience that 50 per cent. more current may be passed through a wire when placed between the ribs in this manner, without breaking the enamel, than where the wire is simply enameled on a plain surface. It is also a fact that these plates used in this way will endure splashing of water about them without breaking the enamel, when the temperature is as high as will be reached in normal use.

Mr. Upton: Mr. President, I would like to add one word, that I believe that at the Exposition at the Crystal Palace in London, the invention of Mr. Carpenter's is one of the leading features. That is, it is most talked about and most noticed by far. There is a large exhibition there, and it is meeting with a great deal of success.

The "Electrical Engineer" Has a House Warming.

Our esteemed contemporary, the *Electrical Engineer*, celebrated the fitting up of its new offices in the *Mail and Express* building with a delightful luncheon from twelve to three o'clock on Wednesday, Oct. 26. Messrs. Phelps, Colvin, Martin, Wetzler, Muldaur, Collins and Boughton received the 250 guests of the afternoon, who all complimented the paper on its handsome quarters.

FIG. 4.

A number of the visiting journalists were shown through the press and composing rooms of the *Mail and Express* by Col. Elliott F. Shepard and Mr. W. R. Worrall. The *Mail and Express* is one of the best equipped, from a mechanical standpoint, of the metropolitan dailies.

Among those who enjoyed lunch and punch with the *Electrical Engineer* were, E. J. Hall, Charles Dutton, H. B. Thayer, A. L. Salt, J. J. Carty, F. A. Pickernell, J. H. Bunnell, Charles W. Price, Charles P. Steinmetz, Stephen D. Field, George F. Porter, Stephen L. Coles, C. O. Baker, Jr., and Ralph Shainwald.

PRESS CLUBS IN CHICAGO.

IMPORTANT MEETING OF THE OFFICIALS OF THE INTERNATIONAL LEAGUE OF PRESS CLUBS—THE LONG DISTANCE TELEPHONE PLACED AT THEIR DISPOSAL AND GREATLY APPRECIATED—A DELIGHTFUL TRIP IN WAGNER PALACE CARS.

The members of the Governing Board of the International League of Press Clubs, taking advantage of the fact that the World's Fair Buildings would be dedicated in Chicago that week, held their regular meeting October 20 at the Auditorium Hotel, where every facility and kindness was extended to them by Proprietor James H. Breslin and his staff.

Much important work relating to the Press Clubs of the country was transacted at the meeting, the following members being in attendance:

Thos. J. Keenan, Pittsburgh *Press;* Dr. John Friederich, *Americanische Schweizer Zeitung;* W. V. Alexander, Boston *Transcript;* P. C. Boyle, Oil City *Derrick;* H. D. Vought, Buffalo *Courier;* John B. Dampman, Reading *Morning Herald;* William Berri, Brooklyn *Standard-Union;* Chas. W. Price, ELECTRICAL REVIEW, New York.

Letters of regret from President de Young, San Francisco *Chronicle;* Vice-Presidents Col. John A. Cockerill, *Morning Advertiser*, New York; Col. C. H. Taylor, Boston *Globe*, and Gen. Felix Agnus, Baltimore *American*, and Executive Committeeman S. G. Lapham, Syracuse, were read and filed.

Arrangements were made for headquarters of the League in the Administration Building during the Columbian Exposition at Chicago next year, and it was decided to so time the next meeting of the League, which is to be held at St. Paul, so that delegates attending could also attend the Press Congress, to be held at the Exposition.

The report of the Committee on Transportation accepting the invitation of the New York Central & Hudson River Railroad and the Wagner Palace Car Company for transportation facilities to and from the St. Paul convention was approved, and a subcommittee of two, consisting of Messrs. Vought and Berri, appointed at the request of the committee on train management.

The offer of a site for the proposed Home for Aged and Infirm Journalists was acknowledged and ordered filed, and an appeal on behalf of the home proposed by Chairman Berri, was ordered printed and sent to the Press Clubs of the United States.

The Minneapolis, Minn., Press Club and the Newspaper Club, of Boston, were elected members of the League.

Votes of thanks to the New York Central & Hudson River Railroad, Michigan Central Railroad, the Wagner Palace Car Company, the Auditorium Hotel Company, Major Moses P. Handy, of the World's Fair Bureau of Promotion and Publicity, and the American Telephone and Telegraph Company, for courtesies extended to the members of the board were unanimously adopted.

Messrs. Dampman and Boyle were appointed a committee on League button to report at the next meeting. The Board then adjourned, subject to the call of President de Young.

The visit of the press people to Chicago was highly enjoyable through the courtesies and thoughtfulness of the persons and companies named in the resolution of thanks. The opening of the long distance telephone line was greatly appreciated and the line was used by nearly every member of the party. Mr. William Berri, of the Brooklyn *Standard-Union*, telephoned an interesting account of the dedication ceremonies to Mr. Murat Halstead, editor of that journal, and several other members of the party talked with Mr. Halstead, who was in his office in Brooklyn, and every word was clearly and distinctly understood at each end of the line.

The trip to and from Chicago was made particularly agreeable by the complete preparations of the Wagner Palace Car Company, the New York Central & Hudson River Railroad and the Michigan Central Railroad. Mr. Geo. H. Daniel and Mr. M. C. Roach, of the New York Central and their wives, Mr. J. C. Yager, of the Wagner Palace Car Company, and his wife, and Mr. O. W. Ruggles, of the Michigan Central Railroad, accompanied the party. Special Wagner palace cars were placed at the disposal of the press people, including one of the newest dining cars. Here the entire party gathered round one large table and enjoyed the finest of meals, accompanied by speeches and toasts after dinner each day, and later on theatricals, charades, legerdemain, dancing, songs, recitations, etc., in the parlor of the private car. A happier party probably never traveled 2,000 miles together, and it is to be doubted if a more enjoyable 50-mile-an-hour experience had been the lot of a single one present.

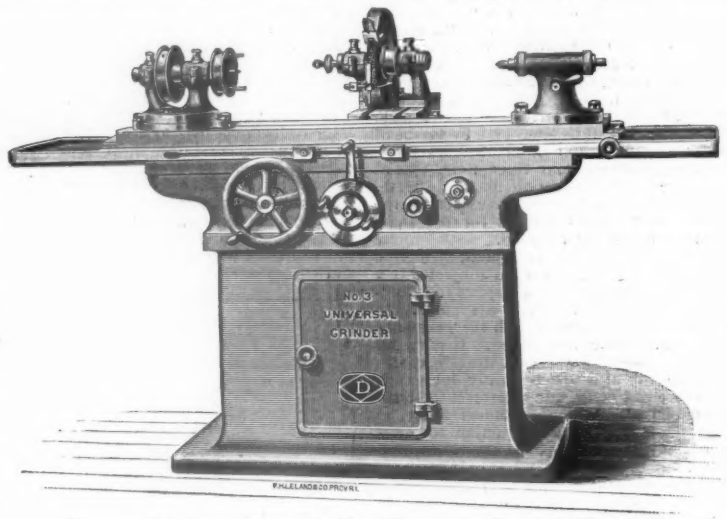
The People's Electric Street Railway, of Rochester, Pa., have a novel arrangement for preventing collisions between their cars at railway crossings with passing locomotives. On each side of the crossing, which consists of four tracks, a derailing switch has been placed. The normal position of this switch is open; that is, a car passing over it will be derailed. Connected with this switch is a series of levers which extends to the other side of the crossing, at which point is located a hand lever, by the use of which the switch can be closed and the car allowed to proceed without being derailed. The operator in handling the switch must retain his hold upon the lever until the car has passed the point, and immediately upon his releasing it the switch opens automatically. The idea of this arrangement is that as a car approaches the crossing the conductor shall get off, cross the tracks, and, by the use of the lever, hold the derailing switch closed until the car has passed. One derailing switch and a hand lever are located on each side of the track, but in coming from either direction the tracks must be crossed in order to operate the hand lever which controls the switch on the side of the track from which the approach is made. This line is also equipped with a regular block signal system, which it is claimed reduces the delays at sidings to a minimum.

A New Universal Grinding Machine.

We take pleasure in presenting to our readers the accompanying illustration of the No. 3 universal grinder, manufactured by the Diamond Machine Company, Providence, R. I.

This machine is the heaviest pattern made by the company named. It is absolutely accurate and uniform in its workings, and is suitable for straight and taper grinding.

The sliding table carries a swivel table which turns upon a center pin. This arrangement provides for grinding tapers without throwing the head and foot stock spindles out of line. The swivel is provided with tangent screws in order to set it accurately. The table may be fed and reversed automatically or by hand, by lever on front of machine. The cross feed is operated by hand or automatically if so ordered. All straight bearings are scraped to surfaces, and all cylindrical bearings are fitted by grinding. The bearing surfaces are carefully protected from emery dust.



DIAMOND MACHINE COMPANY'S NEW UNIVERSAL GRINDING MACHINE.

The machine will swing between centers 12-inch diameter and 30-inch long. The swivel table can be moved to either side of its central position to grind taper from 0 to 2 inches per foot.

For grinding work on face plate or chuck, the head stock can be set at right angles. An internal grinding fixture can be supplied if ordered.

The work can be ground upon fixed centers, being driven by a pulley which revolves upon one of them, or the head stock spindle can be revolved while the work is held in a chuck.

An automatic pump and connections to use water upon the work is fully and effectually provided for in a most satisfactory manner.

This machine is provided with a face plate, center rests, back rests, arbors, wrenches, dog, and complete overhead work.

The Committee on Art of the Columbian Celebration have awarded to the Hotel de Logerot a gold medal for the electrical decorations installed by the Conduit Wiring Company, 12 West Twenty-ninth street, New York City.

Two judgments, aggregating $9,419, have been entered against the Automatic Phonograph Exhibition Company, of New York. One was for $3,940 in favor of Thomas A. Edison. The other was for $5,479 in favor of the North American Phonograph Company.

The Germania Universal Tin Shade.

To the trade which is already familiar with the Germania Universal shade holder, the convenience of the tin shade recently devised by the Germania Electric Company, of 620 Atlantic avenue, Boston, here described, will be at once apparent, it being essentially that shade holder stamped from the material of the shade itself, and applicable to any socket without any difficulty of adjustment of screws or any centering whatever.

The holder attachment consists of four little lugs or fingers stamped from the center of the shade, the ends of these lugs are then turned upward for about a quarter of an inch, and outward again just sufficiently to form a catch for the clamping ring, which is adjustable to the size of any of the sockets on the market by means of the screw which fastens it together.

To apply this shade to any of the regular sockets, the ring is removed and the lugs sprung around the outside of the socket shell and allowed to rest upon the fillet at the edge of the shell; the ring is then placed around the outside of the lugs and the screw tightened so that the shade is clamped firmly in place. When it is desired to attach this shade to the regular Edison socket, the ring is dispensed with entirely, and after removing the rubber bushing from the socket the lugs are pushed inside the shell where the little projections catch in the fillet of the shell allowing the bushing to be screwed into position again which in entering the shell holds the shade securely.

This construction is a great advance over any other shade at present on the market that can be attached without an additional holder, as the holes around the socket allow a circulation of air tending to cool the lamp, a material factor in lengthening the life of the filament.

It is not intended to sell these shades in any finish other than with a fine enamel which gives a smooth white surface wearing for years, and which can be readily washed and kept clean; a material much preferable to lead paint in retaining its color, and not becoming yellow by age. On the outside the finish is a fine glossy green Japan. The saving in the expense of both the shade-holder and labor in attaching the shade to shade-holder, also recommends this handsome piece of apparatus.

FIGS. 1, 2 AND 3.—GERMANIA UNIVERSAL TIN SHADE.

An Electric Railroad for Garden Truck and Milk Cans.

The Rapid Transit Railroad Company was incorporated in Tacoma on October 19, with $100,000 capital stock, to build an electric railroad between Seattle and Tacoma, Wash. The incorporators are John Snyder, E. B. Kittle and L. D. Craig. The line is to be about 34 miles long, and will be on a dead level almost the whole distance, running through rich valleys as level as a table. It will run on the county roads and will have express cars making the trip between the two cities in 50 minutes at the most, and will also make a special feature of hauling garden truck and milk.

It is claimed by Mr. Snyder that there will be no difficulty in running at the speed named, as cars on the Edison line at Tacoma have been speeded up to 35 miles an hour, and great improvements have since been made in electric motors. An electric line has already been built seven miles southward from this city which will form part of the through line.

LETTERS FROM A LABORATORY.—XIX.

BY JULIAN A. MOSES.

An excellent surface upon which may be readily engraved inscriptions, graduated arcs for galvanometers, etc., may be put upon brass plates by the vulcanizing process that I have described in the two previous letters. It is perhaps preferable in this case to use the white variety of hard rubber, as in general it is more satisfactory to write upon a white ground with black. Heretofore all graduations that have been made, were with white upon ordinary black vulcanized rubber. This is, however, merely a matter of taste, but the white ground is by far the neater. To vulcanize the rubber upon the brass plate it is necessary to imbed the latter in plaster in the lower half of the flask shown in Fig. 1; place a piece of varnished pasteboard of the shape and thickness that you desire the rubber to finally possess, over the brass plate. When the plaster in the lower mold has hardened, varnish it with silex (liquid glass), and when this is dry, "pour" the upper half of the mold. Permit this to set; separate the molds when hard; remove the pasteboard, and pack the space thus left with the hard rubber. Screw down the flask, and it is ready for the vulcanizing process. The flask should now be placed in the vulcanizer, which must be about half filled with water; set the stop-cock of the bunsen burner at a point, so that the amount of gas entering the bunsen burner will maintain the flame at such an intensity as to keep the contents at the same temperature, *i. e.*, about 320 degrees F. As this point varies with the pressure of the gas, the regulation of the temperature will be somewhat difficult at first; however, keep this temperature as even as possible for about an hour, and at the end of that time, extinguish the flame, and cool the flask in the manner before described.

Dentists have been accustomed to place the flask in the water; but this method has its defects, for the rubber, if the mass be bulky, is liable to become spongy. This condition is due to a small quantity of water getting between the pieces of the packed rubber and expanding into steam, thus leaving spaces into which it is impossible for the rubber to enter while swelling. This difficulty is overcome by the following simple precaution, which is not generally known: Place the flask on a small tripod stand which can conveniently rest upon the bottom of the vulcanizer. In this position the flask is submerged, but as soon as the water is heated above its point of vaporization, the compressed steam entirely surrounds the press and the vulcanizing proceeds. If we have some complicated pattern to be reproduced in rubber, it is best that it be made of wax; in fact, to obtain any result, wax is indispensable, for it is impossible, without considerable complications and difficulties, to draw a pattern that has undercuts, when the mold is made of plaster. Or, occasion may arise where you desire to add something to your pattern; it is obvious that here wax will serve as an excellent medium to make small additions. The wax model should be buried in the plaster, and when the mold is in the condition ready for packing with rubber, the wax may be removed by dipping the flask into boiling water for a few moments, so that the wax may be softened, and while it is in this condition it may be easily removed by picking it out with a pair of pincers. Should the wax melt, it will sink into the plaster, and the reproduction in vulcanized rubber will have a rough and soiled exterior which will practically spoil it for any use.

Where we have very thick pieces to reproduce, it is advisable to insert into the rubber before vulcanizing some large pieces of hard rubber; this will not only save material, but it has this advantage: The mass of rubber cooks like a loaf of bread, and naturally the outside is done first, so that while the outside is hard and will not permit gases to pass through it, the inside is soft until vulcanizing is complete, and all gases formed will remain entrapped, thus preventing a homogeneous result. It is, therefore, advisable to have as little as possible rubber in the inside, and for this reason it would be wise to reduce the amount to a minimum by making the object hollow.

In order to make a vulcanized rubber shell, a mold must be made similar to one were the body solid, but the rubber before it is put into the mold must be constructed in the form of a "box" which must be filled with some material, such, that when the vulcanizing process is in operation, it must cause sufficient internal pressure to force the mass of rubber against the walls of

FIG. 1.—FLASK FOR HOLDING PLASTER MOLD.

the mold. Either water or ammonium carbonate will answer the purpose. When there are a number of reproductions to be made ammonium carbonate is preferable, as the exact quantity of the salt may be put into the "box" in order to ensure the correct amount of pressure. More care is required in the manipulation when water is used. Suppose the object which we wish to reproduce is a hollow sphere. The mold would be made in plaster, and strips of the rubber cut to such a shape that when they are put together a solid resembling a sphere would be obtained. A small opening must be left, through which should be dropped about one gram of the salt. The edges or seams should now be pinched together with a pair of pincers, and when every seam is entirely closed insert the rubber form into the flask, screw down the bolts and boil in the vulcanizer. When the rubber is thoroughly cooked and the sphere is taken out of the plaster mold, it is not necessary to remove the salt which has solidified in the sphere, as it has adhered to the inner walls, thus causing no inconvenience; however, if exceeding lightness is desired, the salt may be washed out by drilling two small holes in the sphere and washing out the contents. If water is used for the means for causing internal pressure, great care must be observed in the filling of the "box." No water must be allowed to wet the edges of the openings through which the water was introduced. It is best to leave a large opening, for were a small one left it would be very difficult to remove the filling syringe from the opening so as not to leave a small drop adhering to the orifice. In case the opening has been wet, it is advisable to empty out the water already in the "box," dry it out and repeat the operation, being more careful next time. To remove the water from the inside when the vulcanizing is complete, drill a small hole in the sphere and gently warm it; the air inside expanding will drive out all of the water.

Artificial Diamonds.

OUR "LETTERS FROM A LABORATORY" DRAW FORTH A VERY INTERESTING LETTER FROM A SUBSCRIBER.

TO THE EDITOR OF ELECTRICAL REVIEW:

I have followed with much interest the articles published in your valuable paper by Mr. Julian A. Moses, entitled "Letters from a Laboratory"; and I would take the liberty of saying that to me, as well as, I am sure, to many engaged in researches electrical and chemical, the suggestions therein found are of great value. It is seldom that experimenters are allowed to look behind the scenes in the sacred note books of others similarly employed, and, therefore, I think we should be appreciative of the good-will displayed by the writer of these papers. The information derived from their perusal will be found valuable, because evidently drawn from a source thoroughly conversant with the varied and complex requirements of the laboratory.

In your issue of October 8, 1892, Mr. Moses describes an attempt to isolate carbon in its purest form, *i. e.*, the diamond, and it brings to my recollection the story of somewhat analogous experiments made by two members of my family some 50 years ago. Its recital may be of interest as it shows the truth of the hackneyed expression, "Fickle Fortune," and also as it holds out a moral which we would do well to keep before us.

They were two young men, and they resided in the south of France—that sunny land of poetry and song, where man is not made for serious work, but rather for enjoyment, with no thought for the morrow.

Taking up chemistry, they met with financial success as a result of their investigations connected with the electro-deposition of silver, and thus encouraged proceeded to endeavor to crystallize carbon in the form of the diamond.

After a great number of experiments, which, it is said, were conducted in separate bottles placed on shelves, and each standing on a sheet of paper bearing the description of the contents of the bottle, they, one day found a quantity of bright objects in one of the bottles, and on breaking it were in possession of crystals hard enough to scratch glass. These were taken to the nearest jeweler who, without knowing of their origin, pronounced them to be undoubtedly diamonds! It is easy to imagine the joy with which they hurried home, and with which they found vent for their excited feelings in the somewhat juvenile amusement of loading and firing off a small brass cannon during the rest of that eventful day! Unfortunately—alas! that there should be the "but," which to so many of us is framed in

FIG. 2.—PRESS FOR CLOSING FLASK.

crape and looks cynically at us from almost every page of our note books of experiments—unfortunately, when these nearly crazy young fellows, with stains of gunpowder still on their hands, went to look at the remains of the bottle which had contained the successful experiment, they found that they had inadvertently used the label bearing the names of the ingredients and account of the manner of treatment, and, in fact, the whole story of the separation of the crystals—the label of untold worth, as wadding for their cannon, and had blown it to atoms in thin air!

It is scarcely necessary to add that they were never again able to bring together the elements in the same manner that for once had exactly imitated the methods used by Nature in her laboratory when carrying on the construction of the priceless gems.

A curious fact should not be allowed to pass unnoticed; it is that while France was passing through the dark days of the great Revolution, her sons were advancing the cause of science. For instance, Fourcroy, who saved his brother scientists from the clutches of Robespierre in the Reign of Terror, gave us the first chemical nomenclature of value; Vauquelin, as professor of chemistry at the Paris Polytechnic first decomposed disulphite of carbon for the purpose of obtaining the latter in a pure form, and was the discoverer of chromium and glucina; Chaptal, who drove chemistry from the domain of the alchemist by establishing the first chemical works, and who was so greatly admired by George Washington as to receive an invitation from him to come to this country; Darcet, who, associating with the Count of Laugarais created the successful manufacture of Sévres porcelain, and by his researches first showed that the diamond would burn without appreciable residuum.

GUSTAVE GHIMMIE.

New York, October 29.

Engineering Association of the South.

The regular October meeting of the Association was held at the Association headquarters, Nashville, Tenn., on the evening of October 13, Vice-President F. P. Clute, of South Pittsburg, Tenn., presiding. Mr. Ernest William Walpole, city engineer of Talladega, Ala., was elected as a member. The nominating committee, comprising Mr. Newell Sanders, of Chattanooga, Tenn., Mr. J. S. Walker, of Nashville, Tenn., and Mr. Edwin Thacher, of Louisville, Ky., submitted their report covering the nominations of officers of the association for the coming year. The election will be held at the third annual meeting, which occurs at Nashville, on Thursday, Nov. 10, when the president's annual address and the annual reports of committees will be presented.

Generous Contribution of the American Telephone and Telegraph Company to the Press Club Building Fund.

[From the *Journalist*.]

The first business transacted by telephone between Chicago and New York, outside of the private affairs of the American Telephone and Telegraph Company, was a message announcing the donation of $1,000 to the Press Club Building Fund by the Telephone Company. Mr. Edward J. Hall, who received the message, wrote an order formally subscribing the amount and handed it to Charles W. Price, of the sub-committee of the Press Club on electricity. The telephone of to-day plays a part second only to the telegraph in the transmission of news, and this little recognition of a good institution by the telephone people will tend to cement the friendship between them and members of the craft. The telephone will be given a prominent place in the new building.

The Eickemeyer-Field Manufacturing Company.

The Eickemeyer-Field Manufacturing Company, of Yonkers, N. Y., manufacturers of electrical apparatus, was incorporated last week, with a capital of $1,000,000, and they paid for the filing of their certificate $1,250. The company is a consolidation of three companies—the Eickemeyer-Field Company, the Eickemeyer Dynamo Company, and the Yonkers Machine Company. The stock is divided, $935,000 to the first named, $60,000 to the second, and $5,000 to the third. This certificate was offered to the Secretary of State before, but he declined to receive it unless the tax of one-eighth of one per cent. for consolidating was paid. The company refused to pay it, claiming that the law of last year exempted them. The Secretary contended that the law exempted only the consolidation of two companies and not three. The case is in the Court of Appeals. The tax was paid under protest and subject to the Court's decision.

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An interesting development of the alternating current arc lamp is illustrated and described in this issue of the ELECTRICAL REVIEW. The "Helios" lamp is well known in Europe and will undoubtedly meet with equal favor in this country.

In a special paper on "Experiments on the Expansion of Continuous Rails," read at the Convention of the American Street Railway Association, at Cleveland, by Mr. A. J. Moxham, it was demonstrated that the continuous rail was practical under certain circumstances, and within reasonable limits, a perfect fitting joint and proper surrounding roadbed being sufficient to overbalance the expansion and contraction of the rail, and hold it firmly in place, even under a variation of 80 degrees of atmospheric temperature. The stress on the average steel rail under the circumstances would be somewhat less than 12,000 pounds per square inch, which is much less than the elastic limit and consequently harmless. The experiments are but a prelude to the adoption of an absolutely continuous track, probably welded by electricity, in lengths of from 500 to 1,000 feet with specially devised expansion joints at these intervals.

Electricity has been called "The science of what will be." To the practical electrical engineer the problems of "the Now" are of importance rather than discussions on "the Itness of the Was" or the "Nowness of the Whenosity."

The present political agitation reminds us that our methods of voting, regarded from a scientific standpoint, are decidedly crude. The day will doubtless come when ballots will be cast by hand and the rest of it finished by electricity. One of Mr. Edison's earliest inventions was an electrical balloting machine designed for use in assemblies and senates. It was not received with that favor which such a device can, should and will merit only when we have "pure politics."

The incandescent lamp situation is tolerably quiet, a rumor now and then serving to cause a little excitement. One of these rumors is that there is talk of an agreement relative to the use of incandescent lamps between the General Electric Company and the Westinghouse Company instead of another fight in the courts over the new Westinghouse lamp. All fighting must be done between now and November 10, 1893, when the Edison patent expires. The General Electric Company has not yet declared its policy on the lamp question, and it is understood that no definite line of action has been decided upon.

Those electric light enthusiasts who think they can see the gradual decay of a demand for gas until gas companies cease to exist altogether, should read up on the tremendous strides being made in the demand for this fluid for fuel purposes. The latest reports from Massachusetts show that there are now in that State more than 9,000 gas stoves. The most conservative gas engineers estimate that when once the fluid is brought into general use, as it is bound to be for fuel purposes, its consumption will amount to at least six times the largest consumption for illuminating purposes. Instead of gas companies finding their occupation gone, they find that their mission is but fairly begun.—*Cincinnati Times Star.*

Electric light men who can see no use for gas are few in this enlightened day. But they realize that its proper use is as a fuel, as indicated above. Some of the strongest financial alliances recently made have been those between electric lighting and gas companies. There are very few, if any, gas plants of considerable size in course of erection to-day without an electric lighting plant as a necessary adjunct. The gas and electric lighting interests are harmonious, each realizing its dependance on the other.

It is unfortunate that the latter part of 1892 should be marred by labor troubles in the electrical field. A great deal of progress has been made during the year, and much valuable work has been done by both employer and employé. Electrical workers have but recently formed official organizations similar to those in other kinds of industry. Electrical laborers, as a rule, are above the average laborer in intelligence and attainments. It is vitally important that the officers of these new electrical unions should see to it that a conservative policy governs their actions. Reformers and agitators are apt to be iconoclasts and demagogues. A properly governed electrical union can do much good for its members without harming the interests of the employer. An organization of this character has a place and a mission to perform, but when, through the solicitation of a treacherous "walking delegate," or for any other unjust reason, members of the unions are forced to play the "dog in the manger" act, it is time that severe measures were adopted on the part of the employer. There has been a great demand of late for electrical workmen, and as long as the unions can supply efficient men at ruling prices there would seem to be no objection to them simply because they were union men. But when the union supply gives out and there are non-union men ready and willing to work, is it fair for the unions to order a strike because the non-union men are employed? We rather guess not, and hope that the union officials may see their error before it is too late.

SHOCKING A LION.

We remember the German beast tamer who controlled his animals with an electric baton something like an electric gas lighting torch, but the application of electricity to a lion for the purpose of curing disease reads like new matter. The largest of five lions on exhibition at Baltimore was taken sick the other day and Colonel Boone, the owner and trainer, called in a veterinary surgeon, who decided to give his lionship an electric shock. After the matinee performance the lion was led out of its cage by Colonel Boone, who held the animal by one ear. The lion stood patiently while it was securely bound with ropes.

The galvanic current was of unusual strength, and when contact was made with Leo's skin a look of surprise was apparent. The sensation was new to the lion. At first he remained quiet, as if trying to understand what queer thing had taken hold of him. But as the current grew stronger he became uneasy and rolled from side to side, and when the full force of the battery was put on he gave a mighty roar and sprang to his feet, glaring wildly. The roar started the four other lions to roaring, and for a few minutes the sounds were terrifying. The battery was removed and then Colonel Boone quieted the angry animals by speaking to them.

We may yet hear of an elephant's stomach ache being cured by applying a 2,000 volt current. By the way, that would cure the stomach ache, wouldn't it?

A CASE OF MISPLACED POWER.

That organized labor in this country has grown to enormous proportions is a well known fact, and the arbitrary and pernicious power of so called "chiefs" has often been demonstrated, but probably never before has the public been treated to such an exhibition of the despotism of that power as was illustrated in the recent tie-up of the Santa Fé railway system. The mere fact that the signature of any one man at the bottom of a telegram, whether bogus or not, is sufficient authority for stopping the entire business of a great railroad system like the Santa Fé demonstrates that there is something radically wrong, and calls for immediate investigation and action by our legislators. With all due consideration for the rights and privileges of the "laboring classes," it is still well to bear in mind that the men whose brains and capital furnish them employment have also rights which must be respected. That Chief Ramsey of the Order of Railroad Telegraphers disclaims the authorship of the message ordering the men out does not alter the circumstances in the least. The fact remains that his order, or what purported to be his order, was sufficient to entirely suspend business on over 2,500 miles of track, to the great pecuniary loss of the company, to say nothing of the inconvenience and danger to the traveling public. History shows that strikes are injurious—most of all so to the class of men for whose benefit they are supposed to be ordered. The moral to which they point is plain, namely, that too much power is placed in the hands of men like Ramsey and Sweeney, who are prone to rush into untenable positions and drag good men with them into losing strikes—losing because no strike can be permanently successful which demands the virtual surrender of a public highway to the control of men who are not and cannot be held individually or collectively responsible for its management.

The trolley, though a curse to great cities, is a blessing in the rural districts, and the latest trolley scheme, if carried out, will be one of the wonders of the age. It is proposed to run a trolley line through all the towns between Philadelphia, Baltimore and Washington, a distance of 140 miles. Its use, of course, will be limited to local travel, but it will be cheaper and in every way more convenient than the steam roads.—*New York Herald.*

"Though a curse to great cities" is pretty good, when we remember Boston, Brooklyn, St. Paul, Minneapolis, Cleveland, Cincinnati and Pittsburgh. But perhaps these are not "great cities."

CORRESPONDENCE.

OUR BOSTON LETTER.

Messrs. F. A. Barbey & Co., No. 178 Summer street, this city, have been appointed New England agents for Crandall's coil ring packing.

Mr. H. W. Morton, representing the Detroit Electrical Works and the Bradbury-Stone Storage Battery Company, has removed his offices from the Fiske Building, this city, to No. 53 State street.

The Whitney Electrical Instrument Company, formerly at Manchester, N. H., and more recently at No. 85 Hartford street, this city, have taken more centrally located offices, No. 146 Franklin street.

The Electrical Exhibits at the Mechanics' Fair, this city, are more numerous and attractive than ever before. The exhibition of the Beacon Vacuum Pump and Electrical Company, of this city, is admitted to be the most brilliant exhibit at the fair.

Mr. Geo. P. Warde, of the Northern Electrical Supply Company, Concord, N. H., was on a business visit to this city during the week. Mr. Warde spoke enthusiastically regarding the progress of several electrical enterprises recently established at Concord.

The Electric Heat Alarm Company, of this city, has perfected its patent electric alarm for overheated journal bearings, general machinery bearings, and also its low temperature alarm. The company is presenting an attractive exhibit at the Mechanics' Fair, now being held in this city.

The New England Electric Club announces that there will be a musical entertainment at the club rooms on Tuesday evening, November 1. Well-known vocal and instrumental talent has been engaged for this occasion, and the event will undoubtedly be very enjoyable to all who attend.

The American Nut Lock Company, Fitchburg, Mass., has ready for the market its improved spring nut lock, which is positively a new and original device and guaranteed to hold nuts in any position. This is a specially desirable device for holding nuts on dynamos, motors and car wheels.

Dividend.—The trustees of Thomson-Houston securities, series D, have declared a semi-annual dividend of 25 cents per share, payable November 1, 1892, to shareholders of record at close of business October 22, 1892. Transfer books will be closed from October 24 to November 1, 1892, both days inclusive.

Mr. S. D. Condit, of the Massachusetts Electrical Engineering Company, has highly endorsed the new insulating compound "Insullac." Mr. Condit reports "a large unbaked field coil, which was wound with 'Insullac,' as measuring 23 megohms." This speaks volumes in behalf of the new insulation.

Messrs. Austin & Brooks, electrical engineers and contractors, No. 41 Federal street, this city, have taken charge of the construction department of the Redding Electric Company. This will permit the company named to devote more attention to its manufacturing and selling of electrical novelties and specialties.

Mr. F. S. Palmer, general manager and treasurer of the Electric Heat Alarm Company, this city, has kindly arranged with the managers of the Mechanics' Charitable Association for season tickets of admittance to the Mechanics' Fair for the representatives of electrical and local press of this city. Thanks and compliments of the representative of the ELECTRICAL REVIEW are due Mr. Palmer.

The Whitman Agricultural Works, at Auburn, Maine, manufacturers of a general line of agricultural machinery, has purchased from the Mather Electric Company a complete electrical equipment for a 150 light incandescent plant. The Whitman Company has doubled its manufacturing capacity by the addition of another brick building 100x50 feet and five stories high, which is connected with the main building by a steel bridge 91 feet in length.

The Akron Iron Company's New England branch store, No. 54 Purchase street, this city, is furnishing clutches, shafting and bearings for use at the station of the Lawrence (Mass.) Electric Light Company, and the Mt. Beattie Woolen Mills, at Camden, Me. Manager H. H. Abbott has had charge of the installation of the electric light and power equipment at the Mechanics' Fair building, and this isolated plant has been pronounced by excellent judges as one of the most complete in every detail to be found in the country.

New Power House at Salem, Mass.—Advices under date of October 19 state as follows: Ground has been broken for the new power house of the Lynn and Boston Street Railway Company at the company's property on Mason street, and it is hoped to have the station in operation by April or May. The buildings will be substantially constructed of brick, and the roofs will be of iron trusses. The boiler house will be 114x47 and the engine house 114x60. Both will be 20 feet to the eaves. The chimney will be the noticeable part of the establishment, and will serve as a landmark all about that section. It will be of brick, square for 25 feet and then octagonal. At the base the chimney will measure 17 feet square, tapering to the top to 11 feet. The flue will be circular, 8 feet in diameter at the base and 9 feet at the top. Total height, 160 feet; total capacity in horse power, 3,000. The machinery will be furnished by the Hamilton-Corliss Engine Company. Total capacity of station, 3,000 horse-power, about half of which will be put in at once.

Boston, October 29. W. I. B.

OUR CHICAGO LETTER.

D. B. Dean, of the McGuire Manufacturing Company, has gone East on a business trip.

G. E. Horn & Company report many large orders for their well known bells during the past week.

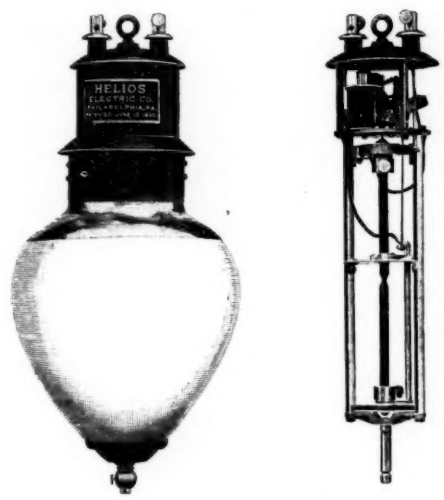
The Enterprise Electric Company report having closed some large contracts for electrical supplies in the West during last week.

George Cutter has been perfecting the Cutter non-inductive voltmeters, and expects to have them on the market during the coming month.

The "C. & C" Electric Motor Company, through their Chicago house, have just installed a 75 arc and a 250 incandescent light plant in the Harvey Street Car Works, at Harvey, Ill.

Edward Lasell & Company, agents for the Duplex Electric Company, Corry, Pa., report having furnished a 40 arc light plant for the town of Downers Grove, Ill., also a 25 horse-power motor for the Virginia Hotel, on Rush street, this city.

Secretary Hornsby, of the Department of Electricity, advises that the offices of his department will be moved to the World's Fair Grounds next week, and will occupy space on the second floor in the southern end of Electricity Building.



THE "HELIOS" ALTERNATING CURRENT ARC LAMP.

Gen. S. T. Carnes, in charge of the National Guard, of Tennessee, was one of the distinguished visitors at Chicago last week. The General is also president of the largest electric light company in his State, and looked up some of his electrical friends while here.

The Washburn & Moen Manufacturing Company, Wednesday, made a public test, in the presence of a number of prominent electrical engineers, architects, and others, of a new wire called the "Salamander," which, it is claimed, is so insulated as to insure absolute safety against danger of fires from overheating. The test was successful.

Work on the South Side cross-town lines of the Chicago City Railway Company, which are to be operated by electricity, is being rapidly pushed forward. The contract for the total equipment of these lines was secured by the Westinghouse Electric and Manufacturing Company, and is the largest order ever placed at one time in the West for electric railway equipment. The lines to be equipped will have a considerable trackage. Sixty-first street will be equipped from State street east to South Park Court, and thence south on this street to Midway Plaisance. South Park Court is the first street west of the Illinois Central tracks. On Sixty-third street electric service will be furnished from Cottage Grove avenue east to Stony Island avenue, with a loop around on Sixty-second and Sixty-fourth streets. The Sixty-first street line will have a stub end terminal for the present, at least. The cross town line on Forty-seventh street will be fitted out with electric service from a point west of Western avenue east to the lake. The Thirty-fifth street line east of State street is the fourth section of road on which the motive power is to be changed.

A much more complete electric system is contemplated for the South Side, as is evidenced by the ordinances now before the Council Committee on Streets and Alleys South. Permission to use the trolley system on Ashland and Wentworth avenues and Halsted street over the entire length of the present lines is asked. Privileges on a number of short connecting streets of less importance is also sought. Electric cars would start on Wentworth avenue at Seventy-ninth street, turn directly north to Archer avenue, and across to State. The Jackson Park traffic will cross the viaduct at Sixty-first street and be taken directly east on that line. Electric cars on Halsted street will be run probably from Sixty-ninth street north to Archer avenue, and the same plan will be followed in regard to the Ashland avenue cars. Archer avenue is to be made an artery to carry all the southern traffic across to State street, where electric trailers will be picked up by the cable line. The South Side Company claims to have handled 600,000 passengers last Friday, and to be able to handle 1,000,000 a day next year when its electric system is in operation.

Chicago, October 29. M. J. B.

OUR CANADIAN LETTER.

Winnipeg, Man.—An explosion in the electric power house at Rat Portage, Man., on Saturday, October 22, injured several men seriously, and will put the town in darkness for some time.

Quebec, Que.—The Quebec and Levis Electric Light Company have purchased from the Hall estate the water power of the Montmorency Falls, with buildings. The price is said to be $235,000.

St. John's, N. B.—The work of substituting electricity for horse power on the street railway will soon be completed. Sixteen motors have arrived from Washington and will be fitted on the cars at once.

St. Catharines, Ont.—The St. Catharines Electric Street Railway, which has been in liquidation for some time, was sold on October 22, at public auction. Mr. George Dawson, of St. Catharines, was the purchaser, paying $20,000 for the road.

Ottawa, Ont.—Mr. W. Wylie, car builder, is building several cars and two sweepers for the electric railway of Montreal; also six cars and one sweeper for the Ottawa Electric Street Railway. Messrs. Ahearn and Soper have given the same manufacturer an order to build 12 vestibule cars and five sweepers. The total value of the cars and sweepers is about $60,000.

Waterdown, Ont.—At a meeting held last week, the sum of $50,000 was subscribed to build an electric railway from Hamilton to Guelph, Ont. The company will have a capital stock of $500,000. Sir W. P. Howland, W. O. Sealy, Leopold Bauer, J. O. Flatt, Dr. McGregor, A. W. Brown, F. Slater, J. Nicholson and W. Laking are to be the provisional directors. J. A. C.

Montreal, October 29.

PERSONAL.

Mr. H. A. Foster, of the electrical division United States Census Bureau, was a New York visitor last week and favored the ELECTRICAL REVIEW with a visit.

Col. H. C. Adams, New York agent for the Fort Wayne Electric Company, was recently elected president of the Phillips Insulated Wire Company, of Pawtucket, R. I. Colonel Adams will resign from the Fort Wayne Company about January 1, and after that will devote his whole attention to the Phillips Insulated Wire Company. He carries with him a valuable knowledge of the wire business gained in previous years, and will doubtless push his company to the front among the leading wire manufacturers.

The "Helios" Alternating Arc Lamp.

Since the introduction of the alternating current for lighting purposes, many authorities to day are of the opinion that the alternating current, owing to its elasticity and flexibility, is the only feasible system for incandescent central station lighting.

The subject of power is certainly much more practically developed in America than in any other part of the world. However, the art of producing a successful commercial arc light has met with comparatively small success, the main difficulty having been encountered in producing a regulating mechanism in an arc lamp which would admit of commercial application. Another point, and of no small magnitude, namely, the singing, rasping noise in the arc, has proven a hitherto unsolved problem; this noise being so great as to be audible at a distance of 100 yards. For the past six years this subject has had the entire attention of Mr. Carl Coerper, of Ehrenfeld Cologne, Germany. It is alleged that this problem was practically solved two years ago, and the results of Mr. Coerper's research and genius are to-day exhibited in the "Helios" arc lamp. The proof of this statement is the fact that many thousands of these lamps are in daily operation in Europe.

The Helios Electric Company, a corporation organized under the State laws of Pennsylvania and located at Philadelphia, has been formed for the specific purpose of manufacturing the "Helios" arc lamp. The lamp as manufactured by this company is certainly of superior mechanical construction. The striking features are:

First. The lower carbon holder is attached to a cable which is carried over a pulley in the lamp mechanism, the other end being attached to the upper carbon holder. The result is that as the lower carbon ascends, in just such proportion does the upper carbon descend, the arc being fixed at a given point and remaining stationary from the time the current is turned on the lamp until the carbons are consumed.

Second. At a distance of one inch and one-half above the arc is placed a reflector, which is necessary in an alternating lamp, owing to the double crater formed in the arc. The rays of light are vertical, and by means of the reflector the total amount of light produced is thrown down instead of otherwise being lost in space. This reflector, it is claimed, increases the efficiency of the lamp at least 40 per cent.

Third. The movement or regulating device is of such nature that, by the variation of the resistance of the arc, the distance between the carbons is lengthened or shortened one thousandth part of one inch. To produce this result, the mechanism must necessarily be delicate and, at the same time, is not complicated. The result of this whole combination is a product of light, the steadiness of which is not exceeded by an incandescent lamp.

The design of the lamp externally is very artistic, the extreme length not exceeding 25½ inches, the outline of the lamp being most graceful. Notwithstanding the complete development of this lamp from a mechanical standpoint, the subject of electrical efficiency has been considered as well.

These lamps are made of the following sizes: 300 watts to produce 1,500 candle-power and 425 watts for 2,000 candle-power.

They are connected in multiple arc and require only 28 volts, this being the most efficient pressure for an alternating current arc. The noise produced by the waves or alternations of current has been entirely removed from the movement of the lamp, and has also been reduced in the arc to such a point that it does not exceed the sound made by the standard direct current lamps.

It has been suggested that the application of this lamp in a great measure solves the problem of lighting by means of alternating currents. It makes feasible the scheme of every mechanical and electrical engineer, that of having one standard unit in every electric light plant, the parts of which are duplicate and interchangeable.

The Bolte Automatic Time-Keeper.

The Bolte automatic time-keeper is a new device for keeping accurately a record of the time of arrival and departure of employés. Fig. 1 shows the complete detail with clock dial and the hand making the registration. Fig. 2 shows a section of the upper part of the record sheet. The cylinder around which this record sheet moves turns in time with the hour hand, making one revolution every 12 hours. The heavy line marked 7 o'clock indicates the hour at which the workmen are expected to arrive. The numbers recorded on the left of this

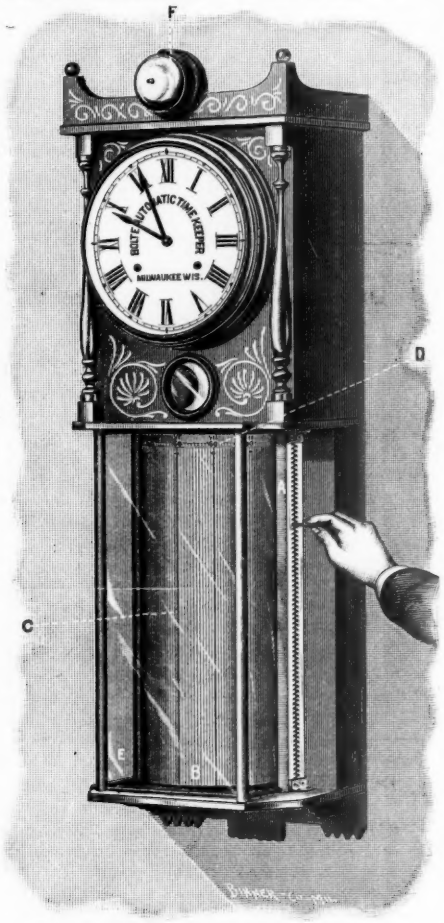


FIG. 1.—BOLTE AUTOMATIC TIME-KEEPER.

line are early, whereas those on the right are late. Each of the light colored lines indicates five minutes; therefore any one registering three lines to the right of the 7 o'clock line would be 15 minutes late, and as the proprietor enters his establishment in the morning one glance at the clock will indicate just those employés who are late or absent, and how many minutes they are behind time.

Fig. 3 shows a section of the key rack, through the openings of which the registrations are made. Fig. 4 shows the registering key full size. Each workman draws his pay according to a certain number, and in this case the one shown is No. 75. This number appears in raised letters on each end of the key; the end marked "in" being nickel, the end marked "out" being of copper. The indication of an employé registering "out" is shown by a star (*) being placed after the number thus: 75*.

The value of this device is self-apparent. Each workman makes his own registration and cannot complain of the time-keeper. No collusion is possible between time-keeper and employés. By actual use it has demonstrated the fact that employés are much less liable to be late, as by the use of the Bolte automatic time-keeper, not only the workmen themselves are able to inspect the record, but their employers are able each day at a glance to ascertain the numbers and names of those who are arriving on time, or others who are habitually late or absent. The device will be placed on the market by the National Time Recorder Company, 361 and 363 East Water street, Milwaukee, Wis.

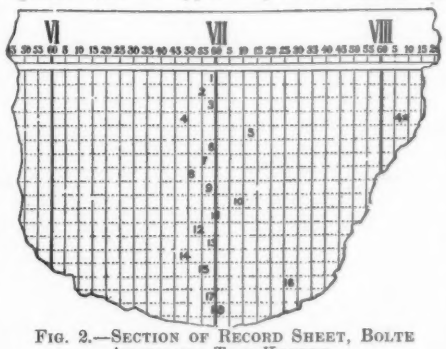


FIG. 2.—SECTION OF RECORD SHEET, BOLTE AUTOMATIC TIME-KEEPER.

A Composition for Incandescent Filaments and Arc Light Pencils.

A recent patent, issued to Mr. Lewis L. Jones, of Brooklyn, N. Y., describes an interesting invention designed to dispense with the high vacuum now necessary in incandescent lamps. While a bitter legal contest has been waging over the right to use carbon filaments in a high vacuum for incandescent lamps, Mr. Jones has been engaged in an effort to do away with carbon altogether, and substitute therefor a material which will conduct current over high resistance and be inoxidizable when maintained at incandescence and surrounded by air.

The composition used contains 90 per cent. of magnesium oxide and 10 per cent. of iron oxide, and the inventor claims for it a greater length of life and increase of brilliancy and steadiness than is attainable with carbon. The compound is prepared by mixing an aqueous solution of magnesium sulphate with an aqueous solution of iron sulphate, and adding a precipitant, as ammonia or soda, then heating, thus throwing down a hydrate, which, when washed, dried, ignited and ground to powder, is converted into an oxide of magnesium and iron. The two oxides as thus precipitated are homogeneously and uniformly mixed, and have all the desirable qualities of a chemical combination, the finished substance being so homogeneous and uniform that its component parts cannot be separated without decomposing it. A powder of this character, containing 90 per cent. of the magnesium oxide and 10 per cent. of the iron oxide, is dissolved in acetic acid and evaporated to a syrupy consistency, and this is used as a binding agent for the powder to form filaments or arc light pencils; after being formed and baked, it will be found to act as a conductor of high resistance. The plastic mass can be molded under pressure or drawn, according to the character of the desired product. An intermediate step in the treatment is taken when arc light pencils are desired, consisting in soaking the pencils in a strong aqueous solution of protosulphate of iron and then baking at a very full heat, the iron compound being reduced to peroxide during the heating. The pencils may then be dipped in powdered carbon and baked at a high heat, thus reducing the oxide at the surface and producing a film of metallic iron, upon which, if a very low resistance is desired, a copper coating may be electro deposited. A conductor thus formed is highly refractory, and may be given any desired degree of conductivity, and is perfectly homogeneous in structure, resulting, in the case of incandescent filaments, in a uniform heating throughout the entire length of the filament. The material is hard and dense, adapting it for filaments of small cross section, and the fact that it is formed of oxides permits of its use when exposed to air without danger of destruction by further oxidation.

In discussing the invention, Mr. Jones says:

"The advantages of pencils made of such material are many. First, intensity and purity of the light, the superiority of the earthy oxides in these respects being well known; second, steadiness of light, the electrodes being of chemical purity and of uniform structure; third, much longer life, not merely from the greater refractory power of the earthy oxides, but from the fact that there is no combustion, as the pencils are already in the highest state of oxidation, and there can be no further combination with the oxygen of the air. The only serious difficulty encountered was the tendency to high resistance, high as compared with the ordinary carbons, but that was overcome; if, however, it had remained an irremediable fault in arc light pencils, it would have been a prime virtue in incandescent filaments, where resistance *must* be high.

"The question of cost of these materials and their manipulation has been carefully considered and satisfactorily determined. For example, a process for procuring pure magnesia in any desired quantity at less than one cent per pound has been thoroughly tested and is now in use on a large scale."

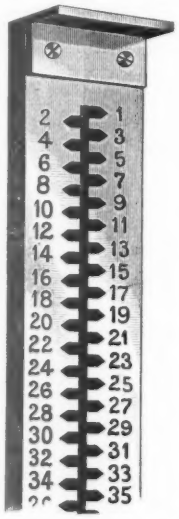


FIG. 3.—SECTION OF KEY RACK, BOLTE AUTOMATIC TIME-KEEPER.

The Growing Business of the Mather Electric Company.

The Mather Electric Company, of Manchester, Conn., with its principal office in Boston, with Mr. A. D. Claflin as general manager, is extremely busy in every department of its extensive work. The business is and has been much larger than usual, and the receipt of new orders causes the outlook to be exceptionally good at this time.

As we have before announced, the company is building an addition to its factory 200x50 feet, special attention being paid to plans by which the larger generator work for street railway and other power purposes may be promptly turned out. This company is now building generators as large as 800 horse-power, these generators being of Prof. William A. Anthony's design. Wherever they have been used they have met with the highest success.

The company expects to be in the new factory about the middle of this month and will then be in much better shape to fill orders more promptly for all classes of apparatus manufactured.

The United Electric Securities Company, of Boston, has declared a one and a half per cent. quarterly dividend, payable Nov. 1 to stock of record Oct. 27. Transfer books close Oct. 27 and re-open Nov. 2.

The Curtis Combined Separator and Steam Trap.

The accompanying illustration shows one of the most useful adjuncts to a steam plant, manufactured by the Curtis Regulator Company, No. 63 Beverly street, Boston, Mass.

The separator is placed in the steam pipe

THE CURTIS COMBINED SEPARATOR AND STEAM TRAP.

between the engine and boiler and is warranted by the manufacturer to separate all the water and insoluble matter from the steam, and deliver only pure dry steam to the engine. The sectional view shows the steam passing through the separator; first, it is sharply deflected downward and on reaching a point midway in the apparatus is sharply deflected upward.

Steam, being a highly elastic fluid readily accommodates itself to these changes of direction. Not so the water and solids carried along with it; these, by their momentum, continue onward instead of turning with the steam and are projected against the inclined faces of the deflector, and gradually falling as they lose their momentum, are gathered in a stream against the side of the separator, and flow downward to the base.

The separation is perfect and the water in the base is automatically removed by a Curtis patented float-trap, the valve being single seated and balanced.

The separator when located in the exhaust pipe separates grease and sediment from exhaust steam; and delivers pure dry steam into pipes for heating, drying, etc.; thus the economic value of the steam is greatly enhanced by this operation. It is a well known fact to engineers and others that wet steam is much more expensive than dry steam, both for engines and for heating purposes.

Manufacturing—Electric Light.

A section of the Alabama code authorizes the consolidation of manufacturing corporations. The Supreme Court of the State held, in the case of Beggs vs. Edison Electric Light Company, that electric light companies are manufacturing corporations within the meaning of this section. The court said: "When we take into consideration that the electricity now used and applied in the ordinary business of life is essentially the product of skill and labor, we find no difficulty in reaching the conclusion that a corporation engaged in generating, storing, transmitting and selling such electricity, to be used for lighting purposes, is a manufacturing corporation. In reaching this conclusion we are not without precedent. The very point we have in hand was ably considered in the case of People vs. Wemple, 129 N. Y. 543. In that case the Court of Appeals of New York were unanimous in the opinion that the electric light company was a manufacturing corporation."—*Bradstreet's.*

FIG. 4.—REGISTERING KEY, BOLTE AUTOMATIC TIME-KEEPER.

MEDICAL ELECTRICITY.

EDITED BY DR. J. MOUNT BLEYER, NEW YORK.

Transactions of the American Electro-Therapeutical Association.

AT THEIR SECOND ANNUAL MEETING, HELD IN NEW YORK, OCTOBER 4, 5 AND 6, 1892.

FIRST DAY, AFTERNOON SESSION.

"A New Treatment of Prostatic Hypertrophy," by Dr. G. Betton Massey, of Philadelphia.

The author said that in order to understand the action of the current on the prostatic gland, one must remember that the bulk of this organ is made up of muscular tissue, and the chief feature in the treatment consisted in the development of the constringent power of the electric current. While mild currents are useful in superficial prostatitis, they will not answer in prostatic hypertrophy. Here, "swelling currents" should be employed, the current being increased from 20 to 70 milliamperes, but only allowed to remain at the maximum strength for a few seconds. If the manipulations are conducted with scrupulous cleanliness and great gentleness, and the sittings repeated not oftener than every five days, the treatment will be followed only by a feeling of relief. The primary current is also used at each sitting, and the author considered it a valuable part of the treatment. He had found this same method also of service in a condition often associated with hypertrophy of the prostate, *i. e.*, a diminished contractility of the bladder. The speaker exhibited a home-made instrument which he had employed for this treatment. It consisted of a silver catheter with a large prostatic curve, which is covered with fused rubber, except just at the eye. The instrument being hollow, enabled one more easily to locate the position of its beak.

DISCUSSION.

Dr. Rockwell had been unable to obtain satisfactory results from the electrical treatment of these cases, either by the method described, which is the ordinary application, or by a number of others which he had tried. He had had an opportunity of treating, recently, a case of marked prostatic hypertrophy, on whom supra-pubic cystotomy had been previously performed, so that there was an unusually good opportunity for observation. With an insulated needle introduced through the abdominal opening, the prostate was pierced to the depth of one-quarter of an inch, and a current of from 15 to 30 milliamperes employed on several occasions, but when the current was finally increased to 50 milliamperes, the treatment was interrupted by the development of an orchitis. With the subsidence of this inflammation, there was a notable decrease in the size of the prostate gland, allowing the patient to pass his urine quite freely. Afterwards the needle connected with the negative pole was introduced into the prostate through the rectum.

Dr. Massey, in closing, said that his experience in this treatment was limited to two cases, both successful. In the first one, that of a man 73 years old, who had been unable to urinate spontaneously, the patient had recovered this power, and had not lost it a year or more later. In the second case, rectal touch showed a marked diminution in the size of the gland after the treatment.

"Electric Cataphoresis and its Practical Application as a Therapeutic Measure."

DISCUSSION.

(*a*) Opening of the discussion by Dr. Frederick Peterson, of New York.

He said that no definite scientific experiments bearing upon the medical aspect of this subject had been made previous to those which he had carried out in the winter of 1888-89, at which time he was especially interested in the treatment of severe neuralgias with galvanism. His first experiments were made upon himself, then upon medical friends and patients, and since his first paper containing the details of these experiments was published other observers had abundantly confirmed his results. There is a streamy movement of the electric current from the positive to the negative pole sufficiently powerful to carry substances in solution through the skin. This is a purely physical action, and in no sense electrolytic. The solution of the drug must be placed on the anode only, and the greater the resistance of the fluids the more powerful will be the cataphoric effect of the current. There are various ways of producing the cataphoresis, one of the best being with the cataphoric electrode. This consists of a metal disk on which is a disk of blotting paper moistened with the solution; thus, a thin film of a known quantity of fluid may be employed and the diffusion greatly accelerated.

(*b*) The Physics of Cataphoresis, by A. E, Kennelly, Esq., chief electrician of the Edison Laboratory, and Prof. E. J. Houston, of Philadelphia.

In the absence of Mr. Kennelly, his paper was read by Dr. Peterson.

The author dealt largely with certain physical phenomena, a knowledge of which is necessary to a proper understanding of cataphoresis. When two liquids, similar or diverse, are brought into communication by a narrow channel of insulating material, such as a glass capillary tube, or a porous diaphragm, a current is produced, and is usually accompanied by a flow of fluid from that which is positive to that which is negative. If the fluids in the two vessels are not on the same level, there will be the usual tendency to re-establish the equilibrium, but on passing the electric current the effect is superposed upon whatever flow may already exist. Hence, in a study of cataphoresis these associated conditions should be eliminated. Given a definite porous septum, and a liquid in its pores, the total quantity of liquid transferred depends upon the amount of electricity transferred, and the result is apparently not affected by the extent of surface of the septum, or by its thickness. The nature of the diaphragm, and of the solution employed, have much to do in determining the quantity of fluid transferred. It must be remembered, also, that the contact of two dissimilar substances gives rise to a current between them. The author then stated various laws governing the motion of solid bodies and of fluids. The rate of transfusion will not be altered by any change in the length of the tube. The only function of the electric current in cataphoresis is to establish a gradient of potential. There is a general tendency for aqueous solutions to move from the anode to the cathode. Water when subjected to friction with glass, also develops a positive potential. While not strictly true, it may be stated, as a general rule, that the transfer of a liquid is inversely proportionate to its solid contents. In conclusion, the author said that while the theory of cataphoresis seems to satisfactorily explain the facts, the measurements which have been made are all too few.

The discussion was then taken up by Professor Edwin J. Houston.

He said that by the term cataphoresis is meant the introduction of drugs or medicaments into the body by means of an electric current, and this is dependent upon electric osmose, or electrical endosmose, as it is more commonly called. Cataphoresis is simply a variety of osmose, and by the term osmose is meant the unequal diffusion or admixture of liquids of different densities through the pores of a diaphragm separating the liquids from each other. Each liquid tends to mix with the other, but the flow is unequal in strength, and hence, there is a higher level produced in that liquid towards which the greater flow is directed. The endosmotic current is that current which is directed towards the higher level; the other is called the exosmotic current. The phenomena of osmosis are intimately associated with those of diffusion. Ordinary osmose appears to be unquestionably accompanied by an electric current which it produces. When an electric current is passed through two liquids across a porous wall which separates them, the movement of the liquid takes place in the direction of the current, and, therefore, the electro-endosmotic current is the one which passes through the septum in the same direction as the electric current. By a similar process, called cataphoresis, fluids may be made to pass through the skin or other membrane of the human body by the action of the electric current. As the causes of osmosis are not well understood, and our knowledge of the causes of electro-osmosis is still more limited, a study of the phenomena of cataphoresis from the standpoint of the physicist must fail, unless supplemented by the studies of the physiologist and the practicing physician. The following are the author's conclusions:

1. That the effects of electro endosmose, or cataphoresis, are more general than heretofore suspected. Thus, whenever an electric current is sent through the human body, whether for ordinary therapeutics, or for some definite cataphoric effect, there must be a true cataphoresis, for there must be produced a flow of the fluids in the body in the direction of the current. It follows, therefore, that the effect of the passage of a current must be to engorge certain parts, and to deplete others, and it is possible that the therapeutic value of the current may arise mainly from such action. Its beneficial effect, may, however, also be dependent upon the establishment of a more uniform condition of pressure in the various tissues, or on the transference of morbid products. This, probably, explains why in so many cases one electrode only is active.

2. Since cataphoric action presumably accompanies the passage of an electric current through the human body, the resistance of the various parts of the body cannot remain uniform, even while their resistance is being measured—a condition very different from that of ordinary conductors. Any change in resistance, due to cataphoric action, should be symmetrical.

3. There are two varieties of cataphoresis: (1) Normal cataphoresis, by means of which a disturbance is effected in the distribution of the constituents of the human body by the passage of any electrical current; and (2) abnormal cataphoresis, by which fluids are introduced into the human body from without by the passage of an electric current.

(*c*) "Its Uses in General Medicine," by Dr. W. J. Morton, of New York.

Dr. Morton said that he had been in the habit of excluding chemical osmosis from the phenomena of cataphoresis, for the reason that osmosis may exist without cataphoresis, and one may even antagonize the other. There has been much confusion concerning the direction of the flow connected with cataphoresis, for solid particles, when suspended in a fluid, pass from the positive to the negative pole, or may pass from the negative to the positive pole. Again, methyl blue goes from positive to negative pole, and eosin from negative to positive. Such facts show that to a certain extent the term "anodal diffusion" is a misnomer. Regarding this subject, however, three broad statements may be made, which are well sustained by various observations. They are: (1) In a fluid or semi-fluid conductor, like the human tissues, there is a movement of the fluids from the positive to the negative pole; (2) extraneous fluids maintained in contact with the skin or mucous membrane, are transported from the positive towards the negative pole, and in this manner, medicinal substances may be made to penetrate the skin and enter the tissues and the circulation; (3) it has been demonstrated with tolerable certainty that medicinal substances in the tissues in a state of solution may be removed by the action of the electric current. This knowledge justifies two distinct divisions of the subject: (1) Cataphoresis, or simple fluid transportation, and (2) cataphoric, medication and de-medication. It is difficult at present to say which will be the more useful in therapeutics.

The author then described a number of interesting experiments on animals which had been made by G. M. Stewart, of the physiological laboratory of Owens College, Manchester, England. The gynæcologists have used currents of such density that the so-called hæmostatic or drying effect of the positive pole may well be due to the removal of fluids, and the liquefying effect of the negative pole to cataphoresis. The dense currents employed in the treatment of fibroid tumors produce contraction of the uterus and diminution of its vascular supply of the tumors, with a loss of its salts. The removal of the salts is the most important element in this treatment.

Regarding cataphoric medication, the author said he had often applied to the body an electrode moistened with a solution of iodide of potassium, and subsequently detected its presence by an examination of the urine. He had also been able by the same action of the electric current to drive particles of graphite so deeply into the hair follicles that they would remain there for weeks. The objection to this method of medication is that the dose cannot be determined with accuracy. Dr. Peterson's method, which is the best yet devised, measured accurately the dose applied, but not the actual amount introduced into the system by the flow of the current. In this connection, it must not be forgotten that if we admit electrolysis as an element of cataphoresis, it is quite possible that medicines, when introduced in this way in their nascent state, may have special efficacy.

There are two systems of introduction, (1) by the ordinary electrode, and (2) by electric baths. The writer published in the New York *Medical Journal* for April 25, 1891, an account of a method of introducing lithium salts into rheumatic joints by a method which he termed "anæmic cataphoresis"—a method of treatment which since then had continued to yield most satisfactory results. Owing to the present confused state of electro-physics, it has been his custom to apply the dissolved medicine to *both* electrodes. Also, with the aid of that special form of the static current, which the author had previously described under the name of "the static induced current," he had been able to produce a cataphoric anæsthesia, and to introduce into the body a great variety of medicinal substances. He also described an interesting experiment which he had made with the static machine to illustrate the transporting action of the current. If glycerine be placed on the positive pole, and the two poles brought about half an inch apart, on setting the machine in operation the glycerine will be seen to travel across from one pole to the other. This transference of the glycerine will not occur if the glycerine be placed on the negative pole.

The efficacy of electric baths has long been a much mooted point. Owing to their very general adoption by quacks, there has arisen a very decided prejudice against them. Nevertheless, the experiments of Mr. Edison, Mr. Kennelly, and other scientific observers of repute, prove beyond a doubt that medicines can be introduced in this way through the unbroken tissues of the body. Austrian and German observers have introduced corrosive sublimate in this way, and have been able to find notable quantities of mercury in the urine for several days afterward. De-medication is not ordinarily called for, since it is probable that the natural methods of elimination are usually all-sufficient, but it has proved useful in the treatment of ulcers from which electroplaters sometimes suffer.

In conclusion, the author said that while admitting the foregoing statements to be facts, we are not yet in a position to give a judicial expression as to the value of these methods of treatment.

(*d*) Its Uses in General Surgery, by W. H. Walling, of Philadelphia. (Read by title).

(*e*) Its Uses in Gynæcology, by Dr. Augustin H. Goelet, of New York.

Dr. Goelet said that he considered cataphoric medication had had only a very limited sphere of usefulness in gynæcology. He had experimented at one time with the positive pole in the vagina, moistened with solutions of morphia and cocaine, and had obtained fairly good results, but he had been led to abandon this line of investigation on account of the superior effects obtained with the faradic current in the way of relieving pain. A novel method of employing cataphoresis consists in molding plaster of paris around a platinum wire, and saturating the plaster with the drug which it is desired to introduce. At present, he only employed cataphoresis for the purpose of producing anæsthesia of the vaginal surface previous to making punctures. This is readily done by moistening the electrode with a four or eight per cent. solution of cocaine, and employing a current of 10 or 15 milliamperes. It not only renders the puncture painless, but materially lessens the subsequent aching.

(*f*) Its Uses in Nervous Diseases, by Dr. Frederick Peterson, of New York.

Dr. Peterson said that after vainly endeavoring in various ways to control the pain of severe supra-orbital neuralgias, he had found that the application of a galvanic current with the anode moistened with a 10 or 20 per cent. solution of cocaine, gave absolute relief for a period of from four to ten hours, and without producing any constitutional effects. As this cataphoric anæsthesia does not seem to mitigate neuralgias having their origin far back of the seat of pain, it is probable, as Dr. M. A. Starr has suggested, that this method also possesses some diagnostic value. He had experimented with a great many other substances, but had found cocaine most suitable for producing anæsthesia; chloroform produced a dermatitis, and helleborin, although producing deep anæsthesia, also causes much smarting.

(*To be continued.*)

Electro-Therapeutics in Gynæcology Made Easy.

A BOOK OF GREAT MERIT, BY DR. AUGUSTINE H. GOELET, EDITOR OF THE ARCHIVES OF GYNÆCOLOGY, N. Y. CITY.

This volume deserves a place on every practitioner's table and library. It is not a book to be read and then shelved, it is one to be studied. It is not based upon hypotheses, but upon facts. It makes the application of electro-therapeutics practical and inculcates a practice based upon a large experience of experimental investigation. This volume is not alone for the gynæcologist, but for the general physician who needs just such a volume as his master to serve him through his daily practice. This author has succeeded, by his happy faculty of analysis and acute observation, in bringing forth an excellent book. We can find therein everything known to us in electro-thereapeutics to be used in the treatment of diseases of women, and thus served up to us in *a la carte* style. His descriptive writing deserves special mention, as he makes clear thereby the most complex of electro-technique. There are many new things to be found distributed throughout this magnificent little work. We can only highly recommend it and thank the author for giving birth to it.—EDITOR.

A man in Columbus, Ohio, has patented an electrical device intended to automatically lower and raise railroad gates at grade crossings at the approach and after the passing of trains. The apparatus is expected to entirely supplant flagmen and gate tenders.

Further Notes of the Exhibition at the Cleveland Street Railway Convention.

Mr. F. C. Randall, of Philadelphia, represented the J. G. Brill Company.

The Western Electric Company made an exhibit of miscellaneous supplies.

The Washington Carbon Company was represented by Mr. John S. Crider.

Mr. C. J. Hill, of the Perkins Lamp Company, was on hand at the Convention.

Mr. C. A. Gates represented the Russell Engine Company, of Massillon, Ohio

The Phœnix Iron Works, of Meadville, Pa., were represented by Mr. John Dick.

The Mosher Arc Lamp Company, of Chicago, was represented by its president, Mr. Reimond.

The John Stephenson cars were talked about by Mr. J. A. Tackaberry and Mr. D. W. Pugh.

The Mather Electric Company, of Manchester, Conn., was represented by Mr. J. M. Angier.

The Hart & Hegeman Company, of Hartford, exhibited their switches in Army and Navy Hall.

The Toledo Electric Heating Company showed a neat and compact electric heater in operation.

Electrical Engineer Frank B. Rae, of Detroit, was present and shook hands with many friends.

Mr. C. O. Mailloux, a well known electrical engineer of New York, was present at the convention.

The Johnson Electric Company, of Cleveland, made an interesting exhibit of electric railway supplies.

The Washburn-Ford Company, of Cleveland, had on exhibition a line of motors and storage batteries.

The Mitchell-Brant Copper Company, of Erie, Pa., exhibited copper castings of commutator segments.

The Shultz Belting Company's rawhide belt and leather pully cover were shown by Mr. J. A. Ferguson.

Mr. Charles Brown, of the Central Electric Company, of Chicago, was present in the interests of his firm.

Chas. A. Schieren & Company, New York. made a fine exhibit of their well-known electric perforated belt.

The Pittsburgh Hollow-Ware Steel Company, of Allegheny, Pa., showed a complete line of rolled steel gongs.

Mr. C. E. Carpenter, the inventor of the Carpenter enamel rheostat, had personal charge of his own exhibit.

The Bodifield Belting Company, of Cleveland, exhibited a line of belting of various sizes in Army and Navy Hall.

The P. Wall Manufacturing Supply Company, of Allegheny City, Pa., exhibited a line of unique steel car gongs.

The Taylor Electric Truck Company, of Troy, N. Y., exhibited the improved Taylor truck for electric or cable cars.

The Johnson Company, of Johnstown, Pa., exhibited a large number of sections of the various rails they manufacture.

Mr. P. H. Hover, of Chicago, represented the Standard Paint Company, of New York, and talked "P. & B." to everybody.

The H. M. Lord & Sons Lumber Company, of Oscoda, Mich., exhibited its octagonal poles for electric railways.

The R. D. Nuttall Company, of Allegheny, Pa., exhibited a very interesting and complete line of electric railway devices.

The iron poles made by the Walworth Manufacturing Company, of Massachusetts, were on exhibition in Army and Navy Hall.

The Charles Scott Spring Company, of Philadelphia, made a handsome showing of spiral and elliptical springs for electric cars.

The Campbell & Zell Company, of Baltimore, Md., were strongly in evidence with the Zell improved water tube safety boiler.

The New York Car Wheel Works, of Buffalo, New York, made a very interesting exhibit of their patent machined car wheels.

The MacIntosh-Huntington Company, of Cleveland, made a fine showing of hardware and tools suitable for electrical purposes.

C. E. Bibber represented the Consolidated Electric & Manufacturing Company, of Boston, and showed a sample of the "Lyon" brake.

Billings & Spencer, of Hartford, were represented by Mr. F. C. Billings, and exhibited a fine line of castings arranged on a display board.

Mr. D. B. Dean represented the Maguire Manufacturing Company, of Chicago, the well known makers of electric railway trucks.

Mr. Hollis French, of the Massachusetts Electrical Engineering Company, of Boston, was in attendance and made many new friends.

The E. S. Greeley & Company, of New York, exhibited a case of electric railway testing instruments and several lamps for electric cars.

The Standard Railway Supply Company, of Chicago, exhibited their car stoves, which can be installed in a street car without cutting the seats.

The Esmond Street Rail Company, of New York, manufacturers of steel rails and car trucks, exhibited their devices in Army and Navy Hall.

The pavilion adjoining Army and Navy Hall was illuminated by 50 Graves arc lamps, which did their work in a perfectly satisfactory manner.

Mr. C. J. Field, president of the Field Engineering Company, of New York, well known electric railway engineers and contractors, was present.

Mr. C. S. Van Nuis, of New York, provided his friends with samples of the "Fulmen" lightning arrester, in case a thunderstorm should come up.

The Carpenter Enamel Rheostat Company, of Bridgeport, Conn., made an exhibit of their devices on the second floor of Army and Navy Hall.

Mr. Soper and Mr. Dewar, of Ottawa, exhibited the Ahearn electric heater, which is now manufactured by the Railway Equipment Company, Chicago.

The Bradley General Electric Company, of Chicago, owners of patents on a conduit system of electric railways, was represented by Mr. Bradley, the inventor.

The Lodge & Shipley Machine Tool Company, of Cincinnati, Ohio, showed in operation a number of their machine tools for the rapid production of lathe work.

The Genett Air Brake Company, of New York and Chicago, was represented by Mr. D. Reed, who explained the operation of the air brake in Army and Navy Hall.

Mr. H. T. Paiste, the Philadelphia switch manufacturer, assured his friends that his presence was a mere accident and was not brought about by malice aforethought.

The International Register Company, of Chicago, exhibited samples of their cash register, the company being represented by Mr. A. H. Englund, secretary and manager.

Mr. W. R. Mason, general manager of the Railway Equipment Company, of Chicago, was present and exhibited a very numerous samples of their "Salamander" wire.

The Edison Manufacturing Company, of New York, exhibited an electrostatic voltmeter which requires no current for its operation, can be read from a distance, is not affected by magnetism and is quite inexpensive.

The Jewell Belting Company, of Hartford, occupied a prominent space in the corridor of the Army and Navy Hall, with a full line of their belting. The company was represented by C. E. Newton, C. L. Tolles and G. W. Bancroft.

Mr. C. A. Benton, formerly with the Detroit Electrical Works, represented the Interior Conduit and Insulation Company, of New York, and interviewed a number of street railway men on the subject of laying railway feeders in the Interior conduit.

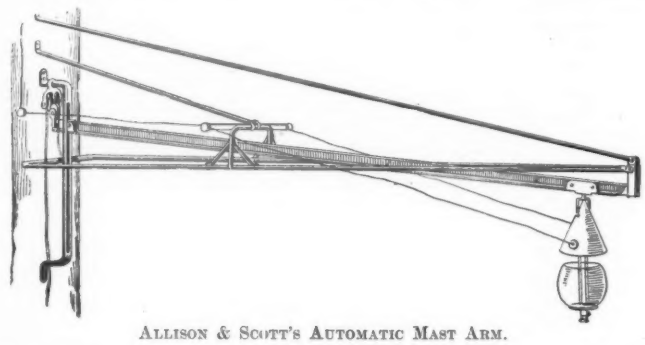
The Sperry Electric Railway Company, of New York, exhibited one of their trucks and equipments (which have been fully described in the ELECTRICAL REVIEW) in Army and Navy Hall, and also had a car in operation on the streets. Mr. Sperry was present.

The Cleveland Cedar Company, of Cleveland, O., issued artistic printed matter describing their cedar poles, red pine octagonal poles, iron poles, cross arms and pins. The company has yards in Cleveland and Huron, O., Coleman, Mich., and Epworth, Ont.

The Duplex Street Railway Track Company, of New York, made a fine showing of their girder rails. The company was represented by Messrs. Elwell and Cargill, and their headquarters at the Stillman House were the scene of a very enjoyable function on Wednesday evening.

The Simplex Electrical Company, of Boston, had their interests well taken care of by Messrs. J. H. Mason and Major D. T. Everts, respectively the general manager and assistant manager of the company. Both gentlemen have many friends and their acquaintance is much appreciated.

Among the notable features of the Hirt six-wheel radial truck exhibited ot Cleveland were the wrought iron castings used on these trucks for clamps, jaws and other parts where great strength and toughness were necessary. They were manufactured by the Wrought Iron Casting Company, of South Boston, Mass., who are doing a large business in this line of work, and also in dynamo and motor castings.



ALLISON & SCOTT'S AUTOMATIC MAST ARM.

Among the other exhibitors were the Porter Tramway Switch Company, 53 Wade Building, Cleveland, exhibited in front of Army and Navy Hall the Porter new rocker switch for electric, horse or cable cars.

Mr. Register, of the Technic Electrical Works, Philadelphia, distributed printed matter regarding his company's new "Philadelphia" trolley, and made himself generally agreeable.

The Dewey Electric Heating Company, of Syracuse, N. Y., made an interesting showing of their heater for electric cars. This heater is also adapted for use in offices and dwellings.

The Hill Clutch Works, of Cleveland, manufacturers of power transmission machinery, had an interesting exhibit in Army and Navy Hall, and distributed printed matter of value.

The Ahearn electric heater was exhibited in operation and was pushed to the front by the Railway Equipment Company, of Chicago, who are now the sole manufacturers of this device.

Messrs. Partridge and Speer, of the Partridge Carbon Company, Sandusky, Ohio, were in charge of the Company's interests and displayed a full line of dynamo, motor and generator brushes.

Messrs. J. A. Taft, P. B. Hayette, S. H. Scovel and W. C. Temple, represented the Babcock & Wilcox Company, of New York, and distributed the company's valuable work entitled "Steam."

The Hooven, Owens & Rentschler Company, Hamilton, O., manufacturers of the well known Hamilton-Corliss engine, distributed a programme of the meeting in a memorandum book form.

The W. H. H. Peck Company, of Cleveland, were represented by Mr. O. A. Foote, and showed some samples of high grade oak tanned belting. The company also deal in rubber goods of all kinds.

The Lodge and Shipley Machine Tool Company, of Cincinnati, had a handsome exhibit of their motor gear lathe in Army and Navy Hall. The company was represented by Mr. Lodge and Mr. Shipley.

The Washburn & Moen Manufacturing Company, of Worcester, Mass., showed a sample case containing some fine examples of wire drawing, and exhibited in addition attractive display of electric railway line material.

Allison & Scott's Automatic Mast Arm.

This is said to be the only electric light mast arm constructed of wrought iron and steel. Side braces of wrought iron pipe; T rail of steel; side braces supported with king beam guy. The head is in one solid piece of wrought iron, with which the side braces and T rail and head guide is connected with wrought iron bolts, allowing the rail to vibrate.

This T rail has a cover of sheet iron the entire length, protecting from ice and snow. The side braces are one inch apart at the outer end and 18 inches at the inner end, bolted to the pole with two bolts to a wrought iron plate which allows this rail to raise and lower 18 inches above and below the horizontal line of the arm.

The carriage which carries the lamp is built of wrought iron, with four one and a half inch wheels. This arm is connected with bolts. There are no set screws or rivets. These arms are used by Allegheny Light Company, of Pittsburgh, and several small towns through the country, and by the Carnegie Steel Company, of Homestead, Pa. They stand the approval of all linemen who handle them. The trimmer can handle the lamp quicker than on any other arm. This arm can be placed on any pole and over the top of all electric road lines with the aid of two or three men. This device is built by A. B. Allison & Scott, 308 Grant street, Pittsburgh. F. A. Barbey & Company, 178 Summer street, Boston, are Eastern agents.

ELECTRIC LIGHT FLASHES.

The Parkersburg, W. Va., Electric Light and Power Company will spend $20,000 in improving its plant.

Receiver Bunn, of the Cooperstown, N. Y., Illuminating Company, has been ordered to pay judgments of $9,963.66 against the concern.

The Laconia, N. H., Electric Light Company has added to its station equipment an alternating current dynamo of the Westinghouse type having a capacity of 500 incandescent lights.

The Edison Electric Illuminating Company, of Boston, has declared a quarterly dividend of two per cent., payable November 1, to stockholders of record at close of business October 18.

Weedsport, N. Y., is being canvassed by parties to whom the village trustees granted a franchise to put in electric lights. To comply with the franchise, the plant must be in full operation by the first of July next.

The Edison Illuminating Company, of Boston, hoped to get its new dynamos connected up with street mains last week in the new Atlantic avenue station. It will then have two engines and four dynamos operating, running in all about 6,000 lights. This, however, will simply be a starter.

The Edison Electric Light Company, of Philadelphia, has retired $273,000 debenture bonds by the issue of the same amount of stock, bringing the capital up to $1,473,009. The company is paying dividends at the rate of eight per cent., and there is talk of an increase to ten per cent.

At a meeting of the New York Board of Fire Underwriters held October 25, it was reported that the Edison Electric Illuminating Company had conceded to the Board's requirement regarding rules of safety for electric lighting. It was voted to resume the inspection of Edison instalments and wiring.

The Camden and Rockport Electric Light Company, of Camden, Me., has sold its plant to the Rockland, Thomaston and Camden Street Railway Company. This company will transfer the street lights to its system, but continue the incandescent lights from the old plant. This will give excellent service upon both systems.

The annual meeting of the Edison Electric Illuminating Company, of Fall River, Mass., was held last week. The report of the treasurer showed that the year had been a prosperous one and a quarterly dividend of two per cent. was declared. The following officers were elected: Clerk and treasurer, Albert T. Dow. Directors, Jerome C. Borden, Frank S. Steven, James B. Harley, Albert F. Dow, John Crossley, Walter R. Goodman and William S. Whitney.

The Palmer, Mass., Electric Company has sold its plant and franchise for lighting Palmer and Monson to a company, the officers of which are as follows: President, George Flint; vice-president, C. L. Gardner; secretary, W. W. Leach; treasurer, C. B. Fiske. These officers, with C. E. Fish and A. M. Young, will be the directors. The plant will be removed to Blanchardville as soon as a building can be erected there, and the present plant will be enlarged at once.

A plan to light by electricity the tracks of the Pennsylvania railroad, between Broad street station and Bryn Mawr, on the main line, and between Frankford and Broad streets, Philadelphia, on the New York division, is under consideration. If the project materializes there will practically be no further use for headlights on the locomotives running between these points, and should the line of electric lights be continued all the way to New York, which is neither impracticable or improbable, the entire roadway will be as light as day at all times.

The Standard Paint Company celebrated the opening of its newly completed buildings at Bound Brook, N. J., on Monday evening, Oct. 24, with a very enjoyable and largely attended house-warming.

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week:

New Electric Railways.

MEMPHIS, TENN.—The Memphis and Prospect Park Railroad Company proposes to adopt the Short electric system.

DENVER, COLO.—The East Side Improvement Company, Bradford H. Du Bois and others incorporators, has been organized, with a capital of $500,000, to construct street railways and build electric light plants.

POUGHKEEPSIE, N. Y.—The Poughkeepsie and Wappinger Falls Railroad Company is the corporate title of the new company, which has purchased the horse railroad here. The company has applied for a franchise for an electric road, and will apply for permission to build along the public highway to Wappinger Falls.

MCKEESPORT, PA.—The Dravosburg, Mendelsohn and Elizabeth Electric Street Railway Company, Joseph A. Skelly principal incorporator, has been reorganized, and will build a single track electric line from Dravosburg to Elizabeth.

STEVENS POINT, WIS.—The common council, of Stevens Point, has granted George A. Whiting a franchise to build an electric street car line between this city and Whiting, a suburb three miles distance. The cost is estimated at $150,000.

MOUNT VERNON, N. Y.—The Union Railway Company has applied for a franchise to build and operate a trolley road in Mount Vernon.

PEORIA, ILL.—The Peoria Heights Street Railway Company has completed its organization by the election of Martin Kingman as president, George W. Constantine, vice-president, and Charles T. Heald, treasurer, and J. B. Samuels, secretary.

ATCHISON, KAN.—The Atchison Electric Motor and Street Railway Company have filed a charter with the Secretary of State. The estimated length of the new railway is 30 miles. The directors for the first year are A. J. Harwi, J. C. Fox, W. F. Dolan, J. T. Hersey and A. W. Simpson, all of Atchison. Capital, $500,000.

PORTSMOUTH, O.—City council has given John F. Brushart and others a franchise for an electric street railway known as route 2.

WORCESTER, MASS.—George H. Seely, New York city, has sold to the Metropolitan Traction Company, the consolidated street railway of this city for $1,400,000. The present capital stock is 7,000 shares, aggregating $700,000. The present bonded debt is $150,000, which is to be increased to at least $500,000 for the purpose of rebuilding the line and equipping with electricity.

ST. LOUIS, MO.—The Connecting Electric Railway Company; capital, $2,000. Incorporators, J. D. Houseman, Jr., F. W. Raeder and Geo. Minch.

LOCKPORT, N. Y.—The Lockport City Electric Railway Company; capital, $150,000. Directors, John Hodge, E. M. Ashley, J. A. Merritt, George McKibben and F. H. Reed.

SEATTLE, WASH.—The Rapid Transit Railroad Company; capital, $100,000. Incorporators, Edward B. Kittle, John Snyder and Louis D. Craig. The object of the company is to build an electric line between Tacoma and Seattle.

Electric Light and Power.

WACO, TEX.—The Franklin Electric Company, of Kansas City, Mo., has offered to build an electric light plant for the city at an estimated cost of $15,000.

ROCKVILLE, CONN.—The common council has passed a resolution calling for a special city election to see if the citizens will vote to appropriate $25,000 for an electric light plant.

PORTCHESTER, N. Y.—A movement is on foot to organize a stock company for the purpose of establishing a system of electric lighting.

ST. PAUL, MINN.—The electric light plant at White Bear Lake, owned by the Thomson-Houston Electric Company, has been purchased by R. E. Wilkinson and others, of St. Paul.

CLAY CENTER, KAN.—The Clay Center Electric and Water Power Milling Company; capital, $150,000. Directors, J. B. Snell and A. F. Dexter, of Clay Center; J. J. Crippon, of Salina, and C. A. Rogers, of Brooklyn.

EUREKA, KAN.—The Eureka Light and Power Company; capital, $30,000. Directors, H. L. Evans, J. D. Pierce and D. B. Fuller.

MERRIMAC, MASS.—E. P. Shaw is considering the matter of building and equipping an electric plant in Merrimac, so as to have ample power for running the cars from Haverhill to Salisbury Beach.

WINONA, MINN.—The Northwest General Electric Company, of St. Paul, will erect an electric light plant at a cost of $20,000.

WEEDSPORT, N. Y.—This village is being canvassed by parties to whom the village trustees gave a franchise to put in an electric light plant.

TIPTON, IND.—The electric light plant owned by A. S. Nickey, has been burned, loss, $20,000; partly insured.

ELMWOOD, ILL.—Elmwood Electric Light Company; capital, $30,000. Promoters, Edwin R. Brown, Laura S. Brown, E. L. Brown.

CHICAGO, ILL.—Marengo Light and Power Company; capital, $25,000. Promoters, Herbert H. Hewes, Clarence H. Cummings, J. H. Brandt.

PEORIA, ILL.—The Keithsburg Electric Light and Power Company; capital, $15,000. Incorporators, E. B. Hillman, L. B. Bradley and H. T. Hays.

ST. LOUIS, MO.—The Suburban Electric Light and Power Company has incorporated with $10,000 paid up capital, and Walter Krauswick and Stanley W. Leonons, of St. Louis County, and Gus. George, of St. Louis City, as stockholders.

DENVER, COLO.—The Lakewood Electric and Investment Company, articles of incorporation; capital, $50,000; will operate in Arapahoe and Jefferson counties, with principal office in Denver. Directors, Frank E. Gove, George D. T. Rouse, Frank W. Loveland, Hedley V. Cooke and H. H. Martin.

PEORIA, ILL.—The Hancock County Electric Light and Power Company; capital, $15,000. Incorporators, E. B. Hillman, L. B. Bradley and H. Y. Yayes.

MIDWAY, MINN.—The Midway Electric Lighting Company, with a capital of $20,000, has been organized to furnish light to the citizens of the Midway district. The officers are: president, Anson S. Brooks; vice-president, C. G. Hargon, Jr.; secretary, C. A. Magnuson; treasurer, D. E. Platter. It is hoped to have the plant in before the snow flies.

WICHITA, KAN.—The Eureka Light and Power Company; capital, $30,000. Directors, J. B. Cloggston, D. B. Fuller, J. B. Pierce, H. L. E. Evans and H. L. Stoddard.

WINONA, MINN.—The Electric Light Company has amended articles of incorporation under the name of the Winona Light, Heat and Power Company, with a capital of $200,000.

NAPESVILLE, ILL.—Pittsfield Electric Company; capital, $20,000. Promoters, Geo. E. Royer, Alvin Scott, Jr., Alvin Scott, Sr.

ST. LOUIS, MO.—Edison Illuminating Company, of St. Louis; capital, $5,000. Promoters, J. J. Tanssig, Aug. Schuer, F. W. Biebinger.

GREEN RIVER, WYOMING.—The Green River Electric Light and Power Company has been incorporated; capital, $12,000.

FREMONT, COLO.—The Cripple Creek Telephone, Electric Light and Power Company; capital, $100,000. Promoters, R. Newell, Jr., L. D. Rondebush, E. J. Eaton, H. H. Bell, W. B. McClelland, John Hazeltine, E. E. Powers.

WARRENSBURG, MO.—Magnolia Light, Heat and Power Company; capital, $20,000. Promoters, W. P. Hunt, A. M. Zimmerman, J. T. Cheatham, W. H. Hartman.

PHILADELPHIA, PA.—The Pennsylvania Railroad Company has under consideration a plan to light by electricity the tracks between the Broad street station and Bryn Mawr, and between Frankford and Broad street. If the project is carried out successfully, the line of electric lights will be continued all the way to New York.

New Manufacturing Companies.

KITTERY, ME.—The Selma Photo-Electric Company has been organized with $10,000 capital, for the purpose of manufacturing electric and photographic goods. The officers are: President, J. F. Iverson, of Boston; treasurer, G. L. Reenstreina, of Boston.

CHICAGO, ILL.—The Stearns Electric Paste Company; capital, $10,000. Incorporators, Joseph J. Kearney, Adolph Cremieux and Thomas A. Coon.

ST. PAUL, MINN.—The Missoula General Electric Company has been incorporated with a capital of $200,000. The incorporators are H. M. Byllesby and H. C. Levis, of St. Paul, and H. W. Turner, of Helena.

Increase of Capital Stock.

DULUTH, MINN.—The Phœnix Electric Company has filed amended articles, increasing its capital to $30,000, with the register.

LOUISIANA, MO.—The Louisiana Electric Company has increased its capital from $6,000 to $12,000.

Telephone and Telegraph.

NEWARK, N. J.—Articles of incorporations have been recorded by the Postal District Telegraph and Protection Company. The incorporators are William T. Smith, A. C. Courter, James M. Trimble, William Mendel and George E. Talcott. The capital is $10,000, of which one-third is paid up.

The firm of Post & Company, electrical supplies, of Cincinnati, assigned recently for the benefit of creditors. The failure was due to an unexpected rush of creditors. The assets are estimated at $90,000, and the firm claims that this amount will cover the liabilities. The firm has resumed business under charge of Benjamin H. Cox, assignee, an order of court to that effect having been secured.

WORLD'S FAIR NEWS.

BY M. J. BULKLEY.

Exhibitors at the World's Columbian Exposition will be governed, so far as their rights are concerned, by rules adopted Wednesday last by the World's Columbian Commission.

This body of men commonly called the National Commission, at its session Wednesday swept the whole field of rules and relieved the board of directors of Chicago from any worry in providing regulations for the administration of the Fair so far as exhibitors are concerned. According to Section 7 of the Act of Congress these rules should emanate from the local directory.

The Exposition shall be open for the admission of visitors during the six months commencing May 1 and ending October 30, 1893, on each day of the week—subject to such regulations hereinafter provided for—except the first day thereof, commonly called Sunday, and on said last mentioned day the said Exposition and the gates thereof shall be closed.

Next the rules state that the gates shall be opened at 6 o'clock A. M. to exhibitors and all employés, and to the public at 8 A. M. and closed at 7 o'clock P. M., except in such cases as the management shall direct for special evening entertainments, and in such instances the gates shall close not later than 11 o'clock P. M. The price of admission is fixed at 50 cents per capita, with the exception of children under six years of age, who will be admitted free. A bureau of collections and admissions is created, to be composed of the President of the World's Columbian Exposition, its Chairman of the Committee on Finance, and Chairman of the Committee on Ways and Means, and the Treasurer and Auditor.

An important regulation provides for the organization of Bureau of Transportation, to be operated under the control of the Director of Works. This bureau will have charge of the receipts of all exhibits and must place them in the various building for installation, in accordance with the wishes of the chiefs of the department.

When it came to the supply of electricity, steam and compressed air, power from shafting, etc., the Commissioners were in doubt as to the reasonableness of the fixed charges. Some of these were considered high, and in order to provide for the modification, in case wisdom or expediency should suggest any change, the following resolution was adopted, and made a by-law:

The board of reference and control shall have power and authority at any time to suggest amendments or modifications to the rules and regulations fixed and established pursuant to Section 7 of the Act of Congress, and when such suggested amendments or modifications shall have been presented to each commissioner in writing, and shall have been assented to and approved of by a majority of the commissioners in writing, the said board of reference and control shall be authorized to promulgate such amendment or modification, and, thereafter, any such rule shall be amended or modified accordingly.

This closed the debate, and the rules as modified were adopted by unanimous vote as previously indicated.

Chicago, October 29.

GENERAL NOTES.

Mr. Robert C. Brown has left at the ELECTRICAL REVIEW office a very handsome and unique glass paper weight advertising the Owl Cigar Company, of New York and Florida.

We acknowledge the receipt of tickets to the first annual ball of the National Brotherhood of Electrical Workers of America, to be held at Casino Hall, Kansas City, Mo., Nov. 2. The proceeds will be devoted to the relief fund of Local Union No. 18.

The Railway Equipment Company, of Chicago, has filed, in the United States Court, an answer in the suit of the Electrical Supply Company against the Put-in-Bay, Ohio, Water Works, Light and Railway Company and others, with cross-bill for a claim of $738.72 for material furnished.

KINDRED INTERESTS

The Colburn Electric Manufacturing Company, Fitchburg, Mass., have sent out a very tasteful and interesting brochure describing their constant potential dynamos and motors.

The Pin and Bracket Mill, of the Central Electric Company, Chicago, is working full force, and turning out thousands of pins and brackets. These goods are made from second growth white oak, sawed with the grain, making them tough and durable.

We have been told that, whether owing to the coming national election or to the Columbian celebrations, business in engines and boilers has been rather lighter this fall than last. A visit to the works of the Ball & Wood Company, at Elizabethport, however, is convincing at any rate that these people have nothing to complain of in the way of orders. They are at present executing a number of important contracts in the East as well as shipping their engines not only to the extreme West and Northwest, but quite a number recently for export. A new catalogue is at present in preparation, illustrative of the recent improvements made by these people, which it is expected will be ready for distribution during the coming month.

The Grain Elevator being built for the Boston & Maine Railroad Company by Messrs. Simpson & Robinson, of Minneapolis, and which is nearing completion, is one of the largest in the country, and is equipped with a model steam plant. The engines are compound condensing of Hamilton-Corliss type, built by the Hooven, Owens & Rentscher Company, to which are connected heaters and surface condensers, manufactured by the Wainwright Manufacng Company, of Massachusetts, having its general offices at Boston. The heater for compound engines and auxiliary heater and surface condenser are of capacity for a 600 horse-power plant. This company has recently furnished some very large surface condensers for marine and stationary plants, all of which are giving the most satisfactory results.

The Ball Engine Company, of Erie, Pa., report that they are having the largest amount of business in their existence, and have enough orders to carry them well through the winter. Among some of their recent orders are the following: Brockton Street Railway Company, Brockton, Mass., one 600 h. p. cross compound; Calumet Street Railway Company, Chicago, Ill., four 300 h. p. cross compound; San Leandro Street Railway Company, San Francisco, Cal., one 500 h. p. tandem compound; East Oakland Street Railway Company, San Francisco, Cal., one 400 h. p. tandem compound; Englewood Electric Light Company, Chicago, Ill., one 600 h. p. cross compound; Binghamton Electric Light Company, Binghamton, N. Y., two 250 h. p. tandem compound; Wheeling Street Railway Company, Wheeling, W. Va., three 250 h. p. cross compound; Pottstown Electric Light Company, Pottstown, Pa., one 200 h. p. cross compound; Erie Electric Motor Company, Erie, Pa., three 130 h. p. tandem.

NOTICE TO ELECTRICAL CONTRACTORS

All Electric Construction Companies and Contractors installing work in the States of Pennsylvania, New Jersey, Maryland, Delaware and District of Columbia, are requested to write for agreement form for such work to the **Secretary of Underwriters' Association of the Middle Department, 316 Walnut Street, Philadelphia.**

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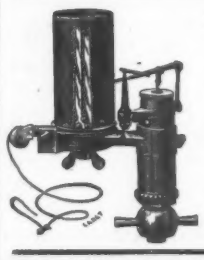

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RECEIVER'S SALE.—In pursuance of an order of the Court of Common Pleas, for the City and County of New York, made on the 30th day of September, 1892, I, the undersigned, the Receiver of the Crosby Electric Company, will sell at Public Auction, by Haydock & Bissell, public auctioneers, at 15 Park Place, in the City of New York, on the 12th day of November, 1892, at 10:30 o'clock in the forenoon, a lot of Electrical Supplies and Merchandise consisting of Dry Batteries, Zinc Cups, Carbons, Jars and Connections, one Surgeon's Cabinet, etc., etc. Catalogue at sale, or of Receiver.

EDO. E. MERCELIS,
Receiver Crosby Electric Co.,
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Dated NEW YORK, October 18th, 1892.

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Planers, 16 in. x 16 in. x 3 ft.; 20 in. x 20 in. x 4 ft.; 24 in. x 24 in. x 6 ft.; 30 in. x 30 in. x 6 ft.; 36 in. x 36 in. x 10 ft.; 42 in. x 42 in. x 12 ft.; 44 in. x 48 in. x 22 ft.; 60 in. x 49 in. x 24 ft.

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